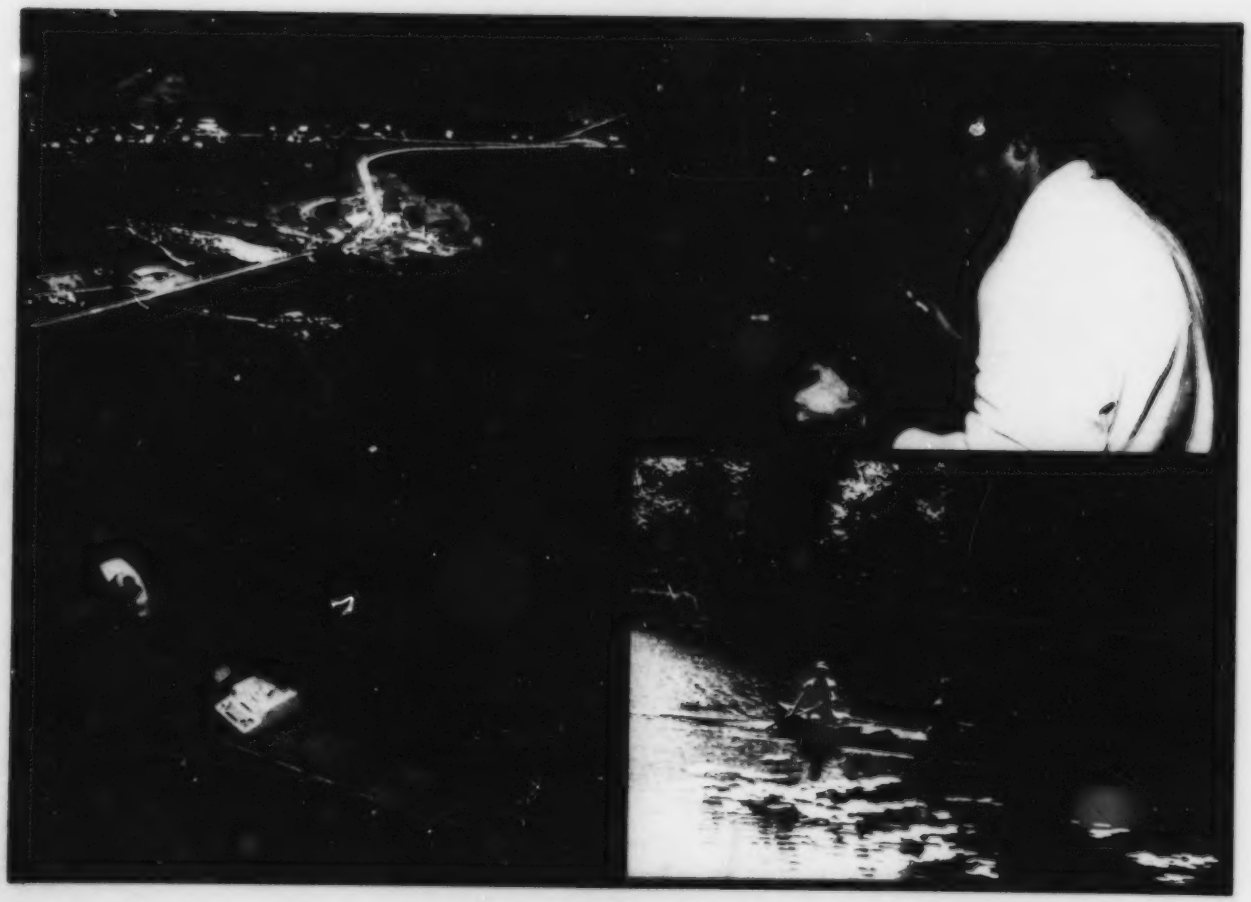
Environment Canada
Conservation and Protection

Environnement Canada
Conservation et Protection

RESULTS OF 1988 WATER QUALITY OBJECTIVES COMPLIANCE MONITORING OF THE INTERNATIONAL SAINT JOHN RIVER BASIN

IWD-AR-WQB-90-165



Canada

INLAND WATERS DIRECTORATE
ATLANTIC REGION
WATER QUALITY BRANCH
MONCTON, NEW BRUNSWICK

RESULTS OF 1988 WATER QUALITY OBJECTIVES

COMPLIANCE MONITORING OF THE

INTERNATIONAL SAINT JOHN RIVER BASIN

IWD-AR-WQB-90-165

Harold S. Bailey

Environment Canada

Conservation and Protection

Inland Waters Directorate

Water Quality Branch Atlantic Region

Moncton, New Brunswick

October, 1991

We Recycle

Think Recycling!

TABLE OF CONTENTS

	PAGE
TABLE OF CONTENTS	i
LIST OF TABLES	ii
LIST OF FIGURES	iii
ABSTRACT	iv
RÉSUMÉ	v
1. Introduction	1
2. Methodology	3
3. Results and Discussion	6
3.1 Objective Compliance	6
Temperature	7
Dissolved Oxygen	7
pH	8
Phosphorus	9
Aluminum	11
Copper	12
Mercury	12
Iron	12
QA/QC	13
3.2 Daily Samples - Aroostook River	13
4. Conclusions	17
5. Acknowledgements	18
6. References	19

TABLES

Table 1: International Saint John River Sampling Stations 21
Table 2: Parameters, Parameter Codes and Detection Limits 22
Table 3: Parameters and their Water Quality Objectives 23
Table 4: Physical Parameters and Major Ion Concentrations 24
Table 5: Extractable Metal Concentrations 28
Table 6: Nutrient Concentrations 31
Table 7: Distilled Water Blanks for Metals and Phosphorus 33
Table 8: Major Ion and Nutrient Data for Daily Samples from the Aroostook River at Tinker Dam 34

FIGURES

Figure 1: Canadian Monitoring Sites in the International Portion of the Saint John River Basin 40
Figure 2: Major Components of a Box and Whisker Plot.. 41
Figure 3: Temperature (Deg. C) at Eleven Stations in the International Saint John Basin - 1988... 42
Figure 4: Dissolved Oxygen (mg/L) at Eleven Stations in the International Saint John Basin-1988.. 43
Figure 5: Dissolved Oxygen (% Saturation) at Eleven Stations in the International Saint John Basin - 1988 44
Figure 6: Laboratory pH (pH units) at Eleven Stations in the International Saint John Basin - 1988 45
Figure 7: Field pH (pH units) at Eleven Stations in the International Saint John Basin-1988. 46
Figure 8: Total Phosphorus (mg/L) at Eleven Stations in the International Saint John Basin-1988. 47

Figure 9: Dissolved Phosphorus (mg/L) at Eleven Stations in the International Saint John Basin - 1988 48
Figure 10: Extractable Aluminum (mg/L) at Eleven Stations in the International Saint John Basin - 1988 49
Figure 11: Dissolved Aluminum (mg/L) at Eleven Stations in the International Saint John Basin - 1988 50
Figure 12: Extractable Copper (mg/L) at Eleven Stations in the International Saint John Basin - 1988 51
Figure 13: Extractable Mercury (µg/L) at Eleven Stations in the International Saint John River Basin - 1988 52
Figure 14: Extractable Iron (mg/L) at Eleven Stations in the International Saint John River Basin - 1988 53
Figure 15: Daily total phosphorus (mg/L) and Discharge (m^3/s) at the Aroostook River at Tinker from June 28 to September 8, 1988 54
Figure 16: Daily total nitrogen (mg/L) and Discharge (m^3/s) at the Aroostook River at Tinker from June 28 to September 8, 1988 55
Figure 17: Total Phosphorus Loading (kg/day) and Discharge (m^3/s) for daily samples at the Aroostook River at Tinker from June 28 to September 9, 1988 56
Figure 18: Total Nitrogen Loading (kg/day) and Discharge (m^3/s) for daily samples at the Aroostook River at Tinker from June 28 to September 9, 1988 57

ABSTRACT

This report compares the water quality data collected in the International Saint John River, between January and November, 1988, with the Water Quality Objectives for selected parameters. The grab sampling data for eleven sites in the international portion of the basin were compared to the established "safe" and "acute" Objectives. The median values for the selected parameters complied with the "safe" water quality Objectives. Individual dissolved oxygen values as percent saturation occasionally fell below the lower "safe" Objective of 80% and exceeded the upper "safe" Objective of 110% saturation on numerous occasions. Sampling schedules for this report period did not coincide with peak spring runoff or rain events resulting in only one detectable non-filterable residue value and accordingly relatively low total phosphorus and total aluminum values. Extractable metals were generally below the detection limit.

RÉSUMÉ

Dans ce rapport, les données recueillies entre janvier 1988 et novembre 1988 sur la qualité des eaux internationales de la rivière Saint-Jean, sont comparées aux objectifs de la qualité des eaux recommandés pour certains paramètres choisis. Les données proviennent d'échantillons ponctuels recueillis à onze stations dans ce bassin. Ces données sont comparées aux objectifs "sans danger" et "aigus" déjà établis. Les valeurs médianes des paramètres choisis se conformaient toutes aux objectifs "sans danger" et "aigus" recommandés. Cependant, les valeurs individuelles d'oxygène dissout étaient quelque fois plus basses que l'objectif inférieur "sans danger" de 80% de saturation, et plusieurs autres valeurs dépassaient l'objectif supérieur "sans danger" de 110% de saturation.

Les périodes d'échantillonnage ne coincidaient pas avec les points maximaux de l'hydrographe dûs à l'écoulement printanier des eaux ou à d'importantes précipitations. Par conséquent, la concentration de solides en suspension ne fut détectée qu'une seule fois, et les concentrations totales de phosphore et d'aluminium étaient donc relativement basses.

Les métaux extractibles mesurés étaient généralement inférieurs aux limites de détection respectives.

INTRODUCTION

The Saint John River Basin, with a total drainage surface area of approximately 55,900 km² is considered one of the largest on the Atlantic seaboard of North America. While the majority of the basin is located within the province of New Brunswick, 19,200 km² or approximately 34% of the basin's total drainage area, is located within the State of Maine. A small portion of the basin is also located within the province of Quebec. The 120 km reach of the Saint John River from the confluence of the St. Francis River downstream to Grand Falls, New Brunswick, serves as the international boundary between Canada and the United States of America.

In February, 1975, use specific Water Quality Objectives for the international waters of the Saint John River (SJR) were recommended for 61 parameters and a number of pesticides (ITAS, 1980). These Objectives were based on the fishable-swimmable criteria incorporated into legislation in the United States of America and agreed to by the Canada-USA committee in 1975. Hence, they are a combination of Water Quality Objectives for fisheries and contact recreational uses. These Objectives were reviewed in 1980 and suggested changes were presented in the report of the International Technical Advisory Subcommittee (ITAS) on Water Quality in the Saint John River (ITAS, 1980). These were finally accepted by the governments of both nations as goals in the water quality management of the International Saint John River Basin.

"Safe and "acute" levels for Water Quality Objectives were developed to support the fisheries or aquatic biota. The "safe" level objective

for a given parameter represents the long-term management goal and should, therefore, be compared to the seasonal or annual mean of the monitoring data. The second level, the "acute" or alert level objective, identifies immediate problems within a single grab sample.

This report presents the analytical results for the samples collected during the 1988 calendar year as part of on-going monitoring program carried out by the Water Quality Branch of Environment Canada in the International Saint John River Basin. The data collected for the eleven sites (Table 1 and Figure 1) which make up the network were compared with the water quality objectives for the fourteen parameters listed in Table 3.

Since this program was designed for the comparison of annual mean and grab sample values with the established objectives, limited interpretation of data will be attempted. Various operational difficulties will be discussed in terms of the application of data in determining compliance with water quality objectives.

METHODOLOGY

At each of the eleven sites sampled, water samples were collected for major ions, nutrients and metals following procedures outlined in "Sampling for Water Quality" (Environment Canada, 1983). In addition, water temperature, dissolved oxygen and specific conductance, were measured in-situ. A separate sample bottle was collected for field pH. That sample was allowed to warm to ambient room temperature prior to measurement.

Dissolved phosphorus and dissolved aluminum samples were prepared by the in-field filtration of an aliquot from each sample. In the case of dissolved phosphorus, a portion of the major ion sample was filtered through a Spectro Grade Gelman glass fibre filter previously rinsed with 2% (by volume) hydrochloric acid. The dissolved aluminum sample was prepared by filtering the sample through a Millipore 0.45 µm membrane previously rinsed with 2% (by volume) nitric acid.

Field preservation of extractable metals and phosphorus was discontinued after April, 1988 in favour of laboratory preservation. The January and February, 1988 samples for extractable metals and dissolved aluminum analysis were preserved with concentrated HNO_3 at the rate of 2 ml/L of sample. Total and dissolved phosphorus samples were preserved by the addition of 0.5 mL of 30% sulphuric acid per 50 mL of sample, while mercury samples were preserved by the addition of 3 mL of a concentrated sulphuric acid / 5% (w/v) potassium dichromate solution per 100 millilitres of sample.

Field quality assurance/quality control employed during the sampling included the collection of sequential triplicates and the use of field and filtration blanks. Field blanks were prepared for extractable metals, total phosphorus and mercury, while filtration blanks were prepared for both dissolved aluminum and dissolved phosphorus. Both types of blanks were treated in exactly the same manner as the samples.

The analyses were performed at the Environment Canada, Water Quality Branch laboratory in Moncton, New Brunswick, using methods outlined in the "Water Quality Branch Analytical Methods Manual, 1979" (Environment Canada, 1979) and are identified by the parameter codes listed in the "NAQUADAT Dictionary of Parameter Codes, 1988" (Environment Canada, 1988). Upon verification of analytical results, the data were transferred to NAQUADAT (National Water Quality Data Bank).

For presentation purposes, the data tables and box and whisker plots have been arranged according to the run of the river, instead of in order by NAQUADAT station number as was the case in previous SJR reports (Lockerbie, 1987a; 1987b). The order of presentation is shown in Table 1.

For data analysis purposes, results which were reported as less than detection were assigned a value equal to 90% of the detection limit. To eliminate the bias of the triplicate samples within the small data set, the "b" and "c" samples of the triplicate were deleted in the tables and

a single mean value of the triplicate was used in the preparation of the box and whisker plots.

Daily Samples - Aroostook River

An ISCO auto-sampler was installed on the Aroostook River at the upper forebay control gates of Tinker Dam (near the Canada/US border) and was programmed to collect daily samples from June 28 to September 9, 1988. The unit, which holds 24 x 750 mL polyethylene bottles was serviced every 24 days. Samples for total phosphorus were sub-sampled by the laboratory staff into 50 mL glass Sovirel bottles on receipt. The analyses for the other parameters were carried out on aliquots from the original 750 mL bottle.

The discharge calculations for the sampling site were based on WRB data from the gauging station on the Aroostook River approximately 2 kilometres below Tinker Dam.

3. RESULTS AND DISCUSSION

3.1 Objective Compliance of Selected Parameters

The data for most parameters which are examined in this compliance report are presented in both tabular and graphical forms. However, the following parameters did not exceed their respective detection limits: non-filterable residue (D.L. - 10 mg/L), extractable lead (D.L. = 0.002 mg/L) and extractable zinc (D.L. = 0.01 mg/L) and are therefore not graphed. The detection limits for these parameters are 2.5 to 3 times lower than the corresponding "safe" Water Quality Objectives.

Data for the physical parameters and major ions, metals, and nutrients are provided in Tables 4, 5 and 6 respectively. The graphs, in the form of box and whisker plots, illustrate the data generated for a particular parameter for each site in the network and will be the principle discussion points. A schematic of the box and whisker plot (Figure 2) illustrates the major components of the plots - the minimum, maximum and median values as well as the corresponding inter-quartile range. The median values rather than the mean values are used to compare the data to the "safe" water quality objective. This is due to the small sample size and the fact that the mean value can be significantly affected by a single outlying value.

Temperature

Figure 3 indicates that none of the sites had water temperatures above the "acute" objective of 25°C, nor did the median values approach the "safe" objective of 20°C. As pointed out in an earlier compliance report (Lockerbie, 1987(a)), the frequency of measurement was too low to give a true indication of compliance or non-compliance with recommended temperature objectives.

Dissolved Oxygen

Dissolved oxygen concentrations, Figure 4, were in compliance with the "acute" objective of 5 mg/L with values ranging from 8.6 to 14.2 mg/L. Figure 5 indicates that the median values for dissolved oxygen as percent saturation complied with the lower and upper "safe" objectives of 80% and 110% saturation respectively.

Although the "safe" objectives were met by the median values, individual values at three of the eleven sites were below the lower "safe" objective of 80%. Two values each fell below the "safe" objective at both the Saint John River at Grand Falls Headpond (75% in January 1988, and 65% in February 1988), and the Aroostook River at Tinker Dam (65% in January 1988, and 77% in February 1988). A single value fell below the "safe" objective at the Saint John River at Clair (70% in February 1988).

The lov oxygen saturations imply that there is a heavy oxygen demand under the ice due to the high concentrations of organic matter from point source input or to algae decay.

The upper "safe" objective for dissolved oxygen of 110% saturation was slightly exceeded at four of the eleven sites but only on one occasion for each. The greatest excedence was at Tinker Dam Forebay on the Aroostook River with a value of 120% saturation. The super-saturation observed may be the result of aeration due to flow (riffles) as in the case of the Green River or to photosynthetic oxygen generation as in the case of the Big Presque Isle Stream and the Aroostook River.

pH

Laboratory and field pH values, illustrated in Figures 6 and 7 respectively, indicate that all pH values were in compliance of the "acute" and "safe" objectives established for this parameter. While the two data sets are quite comparable on a station by station basis, the field pH values are slightly higher. This may be the result of using different instruments and analysts or the conversion of organic carbon to CO_2 during transportation and storage between sample collection and the lab measurement.

Phosphorus

Phosphorus is a nutrient which, in excess, can accelerate plant growth, resulting in nuisance conditions which can interfere with some water uses, such as swimming. Indirectly, excess phosphorus concentrations can also result in lowered dissolved oxygen concentrations when aquatic plants die and utilize oxygen from the water during the decay process.

To prevent nuisance conditions, it is recommended that total or dissolved phosphorus not exceed 0.1 mg/L in floving streams, 0.05 mg/L in streams entering an impoundment, and 0.025 mg/L in an impoundment. The State of Maine has suggested that a level higher than 0.015 mg/L may indicate a potential problem (ITAS, 1980).

Total Phosphorus

Six of the eleven sites had median values for total phosphorus at or below 0.015 mg/L (Figure 8) - St. Francis River, Saint John River at Clair and Edmundston, Green River, Big Presque Isle Stream and Meduxnekeag River. No median values exceeded the safe objective of 0.1 mg/L for floving streams or the "safe" objective for impoundments of 0.025 mg/L. Two individual values did exceed the latter objective at both the Aroostook River at Tinker Dam and the Saint John River at Grand Falls Dam. The highest value for floving water was observed at the Saint John River at St. Basile (0.06 mg/L). The low suspended solid load, as

indicated by the fact that no detectable non-filterable residue was found, would also have resulted in lower overall total phosphorus values.

The station on the Saint John River at Edmundston has shown considerable improvement in total phosphorus concentrations in 1988 as compared to 1986 and 1987. The samples for this station were collected from the left bank in the plume of a sanitary discharge approximately 1 km above the sampling site. Total phosphorus concentrations which reached 0.08 mg/L in 1986 and 0.11 mg/L in 1987, had a maximum concentration of 0.028 mg/L in 1988. The outfall appears to be variable according to its high water marks and debris. During a reconnaissance of the site (July 1991), low discharge of the rainfall resulted in very localized influence whereas the higher discharges might easily result in the higher concentrations observed at the sampling site 1 km downstream. Similar reductions in dissolved phosphorus were also observed.

Total Dissolved Phosphorus

Total dissolved phosphorus is a better indicator of potential eutrophication than total phosphorus since it indicates the portion which is not associated with suspended sediment, and is available for primary production.

All eleven sites had median values of dissolved phosphorus below the potential algal bloom concentration of 0.015 mg/L (Figure 9), however seven sites did have one or more values greater than 0.015 mg/L. Four sites, the Madavaska River, Saint John River at St. Basile, Aroostook

River and Limestone River each had two values exceeding the potential algal bloom concentration.

Although non-filterable residue (suspended sediment(, did not exceed the detection limit of 10 mg/L during this sampling period, the concentrations of total and dissolved phosphorus did differ at some sites. This would probably indicate that suspended sediment was present, but not at reportable levels.

Aluminum

Although aluminum is insoluble in its elemental form near neutral pH, many toxic aluminum salts are soluble at pH levels above 7 as well as in acidic waters (ITAS, 1980). The "safe" level objective for waters with pH levels above 7 is 0.1 mg/L of total extractable aluminum while the "acute" objective is between 1.0 mg/L and 5.0 mg/L of total dissolved aluminum.

All median values for extractable aluminum were below the "safe" objective of 0.1 mg/L (Figure 10) and only at three sites, did individual values exceed the objective during the reporting period. Similarly, the median values for dissolved aluminum were below the "safe" objective, however in this case, no dissolved aluminum values exceeded the objective of 0.1 mg/L (Figure 11).

As was observed with total phosphorus, the extractable aluminum values in 1988 were much lower than the 1986 values. In 1986 when the

suspended solid load was much greater, individual extractable aluminum values exceeded the 0.1 mg/L water quality objective at all stations except one (Lockerbie, 1987b). Values greater than 0.3 mg/L were also reported at three stations the same year.

Copper

Extractable copper values did not exceed the safe objective of 0.005 mg/L (Figure 12). Moreover, four of the eleven sites had extractable copper values below the detection limit of 0.002 mg/L.

Mercury

Extractable mercury values did not exceed the safe objective of 0.064 µg/l (Figure 13). Only two values, both on the Saint John River at Edmundston, slightly exceeded the detection limit of 0.020 µg/l.

Iron

Extractable iron values did not exceed the water quality guideline for the protection of aquatic life of 0.30 mg/L (CCREM, 1987). Median values ranged from 0.07 to 0.12 mg/L, however, the highest single value was reached at St. Basile equaling the water quality guideline (Figure 14).

QA/QC

The results of the QA/QC procedures are not discussed in this report. The small data set from nine sequential triplicates in 1988 is inadequate for data analysis. It will be combined with the 1989 triplicate data and discussed in greater detail in the 1989 Saint John River Compliance report. In general, however, the three sets of triplicate samples indicate good agreement (within 10%) for all parameters except total phosphorus and total dissolved phosphorus which have up to 60% variance. In practical terms, the agreement is good as the example of highest variance is due to the sample being very near the limit of detection. The data for the blanks are presented in Table 7.

Daily Samples - Aroostook River

Daily samples were collected at Tinker on the Aroostook River from June 28, 1988 to September 8, 1988 in order to characterize specific water quality parameters under summer conditions of lov discharge and high agricultural activity.

The Aroostook River, the largest drainage basin (6200 km^2) in central Aroostook County, Maine, discharges into the Saint John River near Perth-Andover, N.B. The major pollution sources in the Basin are food processing industries, domestic sevage, and non-point sources such as urban and agricultural run-off. The two principal nutrients in the basin are nitrogen and phosphorus which result mainly from agricultural run-off and some from domestic and industrial vaste (Anonymous, 1972).

Major ion and nutrient data for the daily samples, calculated values for nitrate-nitrogen, total nitrogen (TN), total phosphorus (TP) loadings, TN/TP ratio and discharge are provided in Table 8. It should be realized that these water quality data were generated from samples that were collected in the headpond of Tinker Dam which would result in a dampening effect with respect to potentially high values. Also since discharge is generally geared to power production, loading values cannot be considered as true daily loadings perhaps with the exception of periods of high discharge when water exceeds the headpond capacity and is released over spillways. The major events for the period peaked on July 4 and 13, and August 9 and 18 (WRB, 1989). The discharge curve for the Aroostook River below Tinker dam is plotted in Figures 15-18.

The total phosphorus values ranged from 0.007 to 0.07 mg/L during the sampling period. All but 15 percent of the values met the "safe" water quality objective for impoundments of 0.025 mg/L as shown in Figure 15. The highest values occurred during periods of very low discharge from June 28 to July 3 and a single value of 0.07 mg/L was recorded on July 31. Total nitrogen values ranged from 0.13 to 0.71 mg/L. The overall relationship between the two nutrients was quite good with a correlation coefficient of 0.81. The anomalous values which were observed for total phosphorus, total nitrogen, and nitrate nitrogen on July 31 appear to be legitimate since these related parameters had similar outliers on that date. The cause for such values would only be conjecture. Also, according to Table 8, no other parameters changed. Considering the low discharge and the dampening effect of the headpond,

it is unlikely that a slug could be evident one day and gone the next. It is more likely that the sample contained finely divided algal material, which may have detached from the control structure and entered the autosampler intake hose. When the major ion bottle (nitrogen analysis) was sub-sampled for phosphorus, a correspondingly high phosphorous value was observed.

The total nitrogen/total productivity ratio (Table 8) is greater than 10 on most occasions indicating that there is an excess of nitrogen and that phosphorus is the limiting nutrient for productivity. On a few occasions (Aug. 2 to 8), the ratio did not exceed phosphorus thus indicating that nitrogen was the limiting factor for primary production for this period.

During the first two days of the study, high nutrient values were coupled with very low discharge. A major rain event resulted in a rapid decrease in nutrient concentrations due to dilution and from that point on, there is a poor correlation between nitrogen or phosphorus and discharge (Figures 15 and 16). It can be speculated that the available nutrients were leached from the soil during the first major rain event. Subsequent events tended to show only dilution effects.

Values for total phosphorus loading to the Saint John River ranged from 14 to 202 kg/day, whereas total nitrogen loading ranged from 210 to 2570 kg/day (Table 8). The highest loadings for both nutrients were recorded on July 2 and August 17 which represented the rising leg of the hydrograph. Loadings were more subdued during two other major rain

events which occurred July 12 and August 9 (Figures 17 and 18). On July 12, the phosphorus value was very low probably due to dilution. Also available phosphorus at the soil interface may have been depleted by the major rain event a week earlier.

There are no active water quality stations on the main stem of the Saint John River below the confluence of the Aroostook River. Based on the relative discharge of the two rivers, the loading of nutrients to the Saint John River would have minimal impact on river as the result of the dilution factor. By Perth-Andover, the nutrient concentrations would be further reduced by the confluence of the Tobique River.

CONCLUSIONS

The median values for the parameters examined in this report were in compliance with the "safe" objectives established for the International Saint John River Basin. Extractable metals were not only below the "safe" objectives but were generally below the detection limit.

Daily samples collected at Tinker on the Aroostook River provided a comprehensive representation of total nitrogen and total phosphorus loadings for future assessment.

ACKNOWLEDGEMENTS

The author would like to acknowledge the assistance received in the production of this report. I gratefully acknowledge the staff of the Analytical Services Division for the water analyses and the Electronic Data Processing Section (EDP) for the assistance when required. Thanks to Dr. Paul Belliveau and Hugh O'Neill (Water Quality Branch) and Gerry Choate (New Brunswick Dept. of Environment) for reviewing the document, and last but not least to Louise Boulter for her able word-processing.

REFERENCES

Anonymous, 1972. The Northern Maine Regional Treatment System. Aroostook River - Presquile Stream. A Plan for Clean Water. The Northern Maine Regional Planning Commission, Presque Isle, Maine.

CCREM, 1987. Canadian Water Quality Guidelines, Canadian Council of Resource and Environment Ministers. Environment Canada, Ottawa, Canada.

Environment Canada, 1988. NAQUADAT Dictionary of Parameter Codes, 1988. Environment Canada, Ottawa, Canada.

Environment Canada, 1983. Sampling for Water Quality, Environment Canada, Ottawa, Canada.

Environment Canada, 1979. Water Quality Branch Analytical Methods Manual, 1979. Environment Canada, Ottawa, Canada.

ITAS, 1980. Review and Update of Water Quality Objectives for the International Saint John River Basin, International Technical Advisory Sub-committee on Water Quality in the Saint John River. Environment Canada, Environmental Protection Service, Halifax, N.S.

Lockerbie, D.M., 1987(a) Compliance of Selected Water Quality Parameters to the Objectives of the International Waters of the Saint John River Basin During the Years 1984 and 1985. IW/L-AR-WQB-87-118. Environment Canada, Water Quality Branch, Moncton, N.B.

Lockerbie, D.M., 1987(b) Results of 1986 Water Quality Objectives Compliance Monitoring-International Saint John River Basin. IW/L-AR-WQB-87-131, Environment Canada, Water Quality Branch, Moncton, N.B.

WRB, 1989. Surface Water Data, Atlantic Provinces, 1988. Environment Canada, Water Resources Branch, Water Survey of Canada, Ottawa, Canada.

TABLE 1

INTERNATIONAL SAINT JOHN RIVER

SAMPLING STATIONS

SITE No.	STATION NUMBER	LOCATION
1	00NB01AD0013	Saint Francis River at Picnic Site
2	00NB01AD0001	Saint John River at Clair from Int'l Bridge
3	00NB01AD0008	Saint John River at Edmundston (WSC Gauge)
4	00NB01AD0016	Madawaska River at Power Plant Tailrace
5	00NB01AF0038	Saint John River at Ste. Basile
6	00NB01AF0021	Green River at W.S.C. Gauge
7	01NB01AF0005	Saint John River at Grand Falls Headpond
8	01NB01AG0001	Aroostook River at Tinker Dam
9	00NB01AG0003	Limestone Stream at Four Falls (WSC Gauge)
10	00NB01AJ0006	Big Presque Isle Stream at Tracy Mills (WSC Gauge)
11	00NB01AJ0029	Meduxnekeag River at Belleville

TABLE 2

A LIST OF PARAMETERS, PARAMETER CODES AND DETECTION LIMITS

Parameter	NAQUADAT Code	Detection Limit
Water Temperature	02065S	--
Dissolved Oxygen (meter)	08102S	--
Specific conc. (field)	02042S	2 µS/cm
pH (field)	10301F	--
Specific cond. (lab.)	02041L	0.2 µS/cm
pH (lab)	10301L	--
Colour	02011L	--
Turbidity	02073L	--
Calcium	20110L	0.040 mg/L
Sodium	11103L	0.10 mg/L
Potassium	19103L	0.10 mg/L
Magnesium	12107L	0.005 mg/L
Chloride	17209L	0.100 mg/L
Sulphate	16304L	1.00 mg/L
Total Alkalinity	10101L	0.5 mg/L
Extractable Iron	26304L	0.050 mg/L
Extractable Manganese	25304L	0.010 mg/L
Extractable Copper	29305L	0.002 mg/L
Extractable Lead	82302L	0.002 mg/L
Extractable Mercury	80315L	0.02 mg/L
Extractable Aluminum	13305L	0.002 mg/L
Extractable Cadmium	48302L	0.001 mg/L
Total Phosphorus	15413L	0.005 mg/L
Total Nitrogen	07601L	0.025 mg/L
Nitrate + Nitrite N.	07110L	0.002 mg/L
Dissolved Organic Carbon	06107L	0.4 mg/L

TABLE 3

PARAMETERS AND THEIR WATER QUALITY OBJECTIVES

NAQUADAT Parameter Code	Parameter Measured	W.Q. Objectives in headwaters	
		Safe	Acute
02065S	Water Temperature (C)	20.0	25.0
08102S	Dissolved Oxygen (mg/L)		>5.0
08102S	Dissolved Oxygen (% Sat.)	>80% <110%	
10301F	pH, Field (units)	6.0-9.0	<4.0,> 9.8
10301L	pH, Laboratory (units)	6.0-9.0	<4.0,> 9.8
13305L	Extractable Aluminum (mg/L)	0.100	1.0 - 5.0
13106L	Dissolved Aluminum (mg/L)	0.100	1.0 - 5.0
15413L	Total Phosphorus (mg/L)	0.100*	0.015***
		0.025**	
15104L	Dissolved Phosphorus (mg/L)	0.100*	0.015***
		0.025**	
10401L	Non-Filterable Residue (mg/L)	25.0	100
29305L	Extractable Copper (mg/L)	0.005	0.020
30304L	Extractable Zinc (mg/L)	0.030	0.080
82302L	Extractable Lead (mg/L)	0.005	0.030
80315L	Extractable Mercury (ug/L)	0.064	3.0

* Nuisance lever for water in a floving stream

** Nuisance level for water in an impoundment

*** Indicative of a potential algal bloom

TABLE 4
PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (MG/L)
FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS
JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SDATE	3 STIME	4 02061 TEMP (DEG.C.)	5 00102 DO (MG/L)	6 00102 DO % SAT	7 FIELD pH	8 LAB pH	9 FIELD SPCOND uS/CM	10 LAB SPCOND uS/CM	11 02011 COLOR (UNITS)
1	00NB01AD0013	13-JAN-88	1030	0.8	12.0	87	7.8	7.6		94	20
2	00NB01AD0013	24-FEB-88	1030	0.0	13.0	91	7.7	7.5	92.0	99	20
3	00NB01AD0013	04-MAY-88	1000	3.9	12.2	96	7.5	7.4		83	25
4	00NB01AD0013	21-JUN-88	1110	19.0			7.7	6.9	84.0	83	20
5	00NB01AD0013	13-SEP-88	820	15.4	8.6	89	7.4	7.2	87.8	94	15
6	00NB01AD0013	16-NOV-88	805	5.9	11.0	91	7.4	7.0	76.0	92	20
7											
8	00NB01AD0001	13-JAN-88	1130	0.0	11.4	80	7.5	7.5		77	20
9	00NB01AD0001	24-FEB-88	1150	0.0	9.9	70	7.3	7.1	74.0	79	20
10	00NB01AD0001	04-MAY-88	1100	5.5	12.3	101	7.4	7.2		49	50
11	00NB01AD0001	21-JUN-88	1010	20.0			7.7	6.9	76.0	73	20
12	00NB01AD0001	13-SEP-88	920	14.6	9.5	96	7.4	7.1	68.4	70	40
13	00NB01AD0001	16-NOV-88	910	2.2	13.9	105	7.5	6.8	56.0	57	60
14											
15	00NB01AD0008	13-JAN-88	1330	0.0	12.6	89	7.5	7.5		83	15
16	00NB01AD0008	24-FEB-88	1420	0.0	11.9	84	7.3	7.6	134.0	146	10
17	00NB01AD0008	04-MAY-88	1240	4.0	12.5	98	7.7	7.6		128	15
18	00NB01AD0008	21-JUN-88	900	20.0			7.5	6.8	84.0	84	20
19	00NB01AD0008	13-SEP-88	1025	14.0	9.1	91	7.5	7.1	82.4	83	40
20	00NB01AD0008	16-NOV-88	1035	2.9	13.4	102	7.6	6.9	64.0	65	50
21											
22	00NB01AD0016	13-JAN-88	1315	0.0	12.5	88	7.8	7.9		142	5
23	00NB01AD0016	24-FEB-88	1320	0.5	14.0	100	7.9	7.2	135.0	146	10
24	00NB01AD0016	04-MAY-88	1255	6.2	12.1	1101	6.8	6.8		55	40
25	00NB01AD0016	21-JUN-88	825	17.0			7.7	7.7	140.0	137	20
26	00NB01AD0016	13-SEP-88	1055	14.9	9.4	96	7.8	7.5	165.0	140	10
27	00NB01AD0016	16-NOV-88	1105	5.4	13.0	106	7.8	7.3	140.0	137	10
28											
29	00NB01AF0038	13-JAN-88	1515	0.0	14.0	99	7.6	7.6		165	30
30	00NB01AF0038	04-MAY-88	1330	5.0	13.0	105	7.3	7.5		111	25
31	00NB01AF0038	21-JUN-88	755	18.5			7.5	7.8	174.0	177	50
32	00NB01AF0038	13-SEP-88	1145	14.5	8.6	87	7.4	7.1	165.0	165	50
33	00NB01AF0038	16-NOV-88	1135	4.6	13.9	111	7.3	7.2	120.6	123	30
34											
35	00NB01AF0021	13-JAN-88	1600	0.0	12.6	89	7.7	7.8		105 L5.	
36	00NB01AF0021	13-JAN-88	1605	0.0	12.6	89	7.6	7.8		105 L5.	
37	00NB01AF0021	13-JAN-88	1610	0.0	12.6	89	7.6	7.8		106 L5.	
38	00NB01AF0021	24-FEB-88	1550	0.0	11.8	83	7.5	7.6	118.0	124 L5.	
39	00NB01AF0021	04-MAY-88	1355	7.2	12.1	103	7.6	6.9		75	10
40	00NB01AF0021	21-JUN-88	730	17.0			7.7	7.1	114.0	113	5
41	00NB01AF0021	13-SEP-88	1220	11.5	10.3	98	7.5	7.4	88.4	89 L5.	
42	00NB01AF0021	16-NOV-88	1201	2.8	14.9	114	7.1	7.1	82.4	91 L5.	
43											
44	01NB01AF0005	14-JAN-88	900	0.0	10.6	75	7.6	7.3		120	10
45	01NB01AF0005	25-FEB-88	1030	0.0	9.2	65	7.4	7.2	124.0	132	25
46	01NB01AF0005	25-FEB-88	1035	0.0	9.2	65	7.4	7.2	124.0	132	25
47	01NB01AF0005	25-FEB-88	1040	0.0	9.2	65	7.4	7.2	124.0	133	25
48	01NB01AF0005	04-MAY-88	1530	5.9	12.2	101	7.1	7.1		71	40
49	01NB01AF0005	20-JUN-88	1440	20.8			7.8	6.9	116.0	110	25
50	01NB01AF0005	12-SEP-88	1430	15.4	9.2	95	7.4	7.3	97.0	96	40

TABLE 4
PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (MG/L)
FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS
JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SDATE	3 STIME	4 02061 TEMP (DEG.C.)	5 00102 DO (MG/L)	6 00102 DO % SAT	7 FIELD pH	8 LAB pH	9 FIELD SPCOND uS/CM	10 LAB SPCOND uS/CM	11 02011 COLOR (UNITS)
51	01NB01AF0005	15-NOV-88	1420	2.5	12.0	91	7.4	6.9	80.0	79	45
52											
53	01NB01AG0001	12-JAN-88	1630	0.0	9.2	65	7.6	7.5		123	10
54	01NB01AG0001	23-FEB-88	1540	0.0	11.0	77	7.4	7.4	118.0	126	10
55	01NB01AG0001	03-MAY-88	1610	6.2	12.4	103	7.5	7.2		61	45
56	01NB01AG0001	20-JUN-88	1210	21.8			8.1	7.0	146.0	141	10
57	01NB01AG0001	12-SEP-88	1220	16.5	9.6	101	8.0	7.5	120.6	117	40
58	01NB01AG0001	12-SEP-88	1225	16.5	9.6	101	7.9	7.5	120.6	117	35
59	01NB01AG0001	12-SEP-88	1230	16.5	9.6	101	7.9	7.4	120.6	117	40
60	01NB01AG0001	15-NOV-88	1235	2.4	12.4	120	7.8	7.1	86.0	85	60
61											
62	00NB01AG0003	12-JAN-88	1730	0.0	11.8	83	8.0	8.2		332	5
63	00NB01AG0003	23-FEB-88	1630	0.5	13.5	97	8.1	8.0	310.0	331	5
64	00NB01AG0003	03-MAY-88	1630	9.0	11.8	105	8.1	8.0		240	25
65	00NB01AG0003	20-JUN-88	1240	20.2			8.4	8.1	282.0	281	10
66	00NB01AG0003	12-SEP-88	1330	13.7	11.0	110	8.7	8.7	224.0	238	40
67	00NB01AG0003	15-NOV-88	1305	3.7	12.5	98	8.2	8.1	276.0	285	30
68	00NB01AG0003	15-NOV-88	1310	3.7	12.5	98	8.1	8.0	276.0	285	30
69	00NB01AG0003	15-NOV-88	1315	3.7	12.5	98	8.1	8.1	276.0	286	30
70											
71	00NB01AJ0006	12-JAN-88	1330	0.0	12.2	86	7.8	8.2		362	L5.
72	00NB01AJ0006	23-FEB-88	1415	0.0	13.0	92	7.8	8.1	320.0	335	L5.
73	00NB01AJ0006	03-MAY-88	1430	6.8	13.4	113	8.1	8.2		229	15
74	00NB01AJ0006	03-MAY-88	1432	6.8	13.4	113	8.0	8.1		230	15
75	00NB01AJ0006	03-MAY-88	1434	6.8	13.4	113	8.2	8.1		229	15
76	00NB01AJ0006	20-JUN-88	1055	19.0			8.0	7.9	354.0	343	5
77	00NB01AJ0006	12-SEP-88	1100	13.5	11.2	111	8.1	8.2	231.6	301	5
78	00NB01AJ0006	15-NOV-88	1125	3.2	12.4	96	7.9	8.1	278.0	285	5
79											
80	00NB01AJ0029	12-JAN-88	1430	0.0	14.2	100	7.9	8.0		206	5
81	00NB01AJ0029	23-FEB-88	1300	0.5	13.6	97	7.7	7.6	188.0	199	10
82	00NB01AJ0029	03-MAY-88	1330	6.2	12.8	107	7.6	7.5		118	35
83	00NB01AJ0029	20-JUN-88	925	20.0			8.0	7.6	320.0	223	5
84	00NB01AJ0029	20-JUN-88	927	20.0			8.0	7.5	320.0	219	5
85	00NB01AJ0029	20-JUN-88	929	20.0			8.2	7.5	320.0	218	5
86	00NB01AJ0029	12-SEP-88	945	13.8	10.3	103	8.2	7.8	167.6	167	25
87	00NB01AJ0029	15-NOV-88	1000	3.2	12.7	98	7.9	7.4	86.2	145	35

TABLE 4
PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (MG/L)
FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS
JANUARY 1988 TO DECEMBER 1988

0	1 STN	12 02073 TURB (JTU)	13 10101 T ALK (MG/L)	14 20110 Ca (MG/L)	15 12107 Mg (MG/L)	16 19103 K (MG/L)	17 11103 Na (MG/L)	18 16304 SO4 (MG/L)	19 16309 SO4 (MG/L)	20 17209 Cl (MG/L)	21 10401 NF RES (MG/L)
1	00NB01AD0013	0.7	35.8	15.0	1.30	0.31	1.9	5.4	5.3	2.10	L10.
2	00NB01AD0013	0.5	38.1	16.0	1.40	0.33	2.0	6.2	6.2	2.10	L10.
3	00NB01AD0013	1.6	30.2	13.0	1.20	0.38	1.9	5.6	5.1	2.40	L10.
4	00NB01AD0013	0.6	30.0	13.0	1.10	0.35	1.8	5.6	5.0	1.90	L10.
5	00NB01AD0013	1.1	36.4	15.0	1.30	0.35	2.0	5.1	4.9	2.00	L10.
6	00NB01AD0013	0.5	35.1	15.0	1.30	0.37	2.1	5.7	3.6	1.90	L10.
7											
8	00NB01AD0001	0.4	27.1	12.0	1.50	0.27	1.5	6.3	6.1	1.20	L10.
9	00NB01AD0001	0.4	26.5	12.0	1.50	0.33	1.8	6.7	6.0	1.80	L10.
10	00NB01AD0001	1.5	15.6	7.4	0.96	0.32	1.1	5.1	4.5	0.90	L10.
11	00NB01AD0001	0.6	26.9	11.0	1.30	0.39	1.5	5.8	5.5	1.00	L10.
12	00NB01AD0001	0.6	26.7	11.0	1.40	0.36	1.5	5.3	4.3	1.10	L10.
13	00NB01AD0001	1.2	19.4	9.0	1.20	0.29	1.3	6.4	5.6	0.90	L10.
14											
15	00NB01AD0008	0.4	29.0	12.0	1.62	0.31	1.9	6.2	6.1	2.00	L10.
16	00NB01AD0008	0.6	58.0	23.0	2.70	0.51	3.1	6.5	6.2	3.40	L10.
17	00NB01AD0008	1.3	51.8	19.7	2.40	0.47	2.5	6.0	5.7	2.60	L10.
18	00NB01AD0008	0.6	29.8	12.0	1.50	0.44	2.2	6.2	5.8	2.40	L10.
19	00NB01AD0008	2.0	29.0	12.0	1.50	0.53	2.6	5.7	5.1	2.90	L10.
20	00NB01AD0008	0.9	21.5	10.0	1.30	0.32	1.7	6.4	5.6	1.50	L10.
21											
22	00NB01AD0016	0.6	58.1	22.0	2.60	0.44	2.6	6.1	6.0	2.70	L10.
23	00NB01AD0016	0.6	30.0	14.0	2.00	0.47	10.5	7.0	6.5	18.80	L10.
24	00NB01AD0016	1.7	17.8	8.0	1.10	0.33	1.3	5.1	4.6	1.30	
25	00NB01AD0016	1.4	53.2	21.0	2.60	0.48	2.7	6.5	6.0	2.60	L10.
26	00NB01AD0016	2.5	57.6	22.0	2.70	0.53	3.0	6.3	5.8	3.30	L10.
27	00NB01AD0016	1.0	57.9	21.0	2.60	0.50	2.7	6.5	6.0	2.40	L10.
28											
29	00NB01AF0038	1.3	53.9	23.0	3.30	0.62	5.1	16.1	15.0	5.80	L10.
30	00NB01AF0038	1.5	40.4	16.0	2.20	0.49	2.8	7.3	6.9	3.20	L10.
31	00NB01AF0038	1.9	53.4	22.0	3.80	0.81	6.5	16.4	16.0	8.80	L10.
32	00NB01AF0038	1.9	46.8	22.0	4.00	1.07	6.0	17.5	17.6	7.90	L10.
33	00NB01AF0038	0.9	44.9	18.0	2.30	0.52	3.2	8.7	8.2	3.80	L10.
34											
35	00NB01AF0021	0.3	42.4	16.0	2.30	0.22	1.6	5.0	4.5	1.00	L10.
36	00NB01AF0021	0.4	43.3	16.0	2.30	0.24	1.6	5.1	4.6	1.00	
37	00NB01AF0021	0.3	43.2	16.0	2.30	0.24	1.6	5.1	4.5	1.10	
38	00NB01AF0021	0.3	53.1	20.0	2.60	0.26	1.7	5.4	5.0	0.90	L10.
39	00NB01AF0021	1.6	29.7	11.0	1.90	0.23	1.2	4.6	4.1	0.73	L10.
40	00NB01AF0021	1.4	48.5	18.0	2.40	0.27	1.6	4.9	4.8	0.80	L10.
41	00NB01AF0021	0.5	38.0	14.0	2.10	0.28	1.6	4.2	4.0	0.80	L10.
42	00NB01AF0021	0.5	38.4	14.0	2.00	0.25	1.5	4.7	4.4	0.60	L10.
43											
44	01NB01AF0005	0.6	42.1	17.0	2.30	0.45	2.9	10.1	9.3	3.10	L10.
45	01NB01AF0005	1.2	41.9	18.0	2.60	0.64	4.3	12.5	11.4	4.60	L10.
46	01NB01AF0005	1.1	41.2	18.0	2.60	0.65	4.2	12.5	11.4	4.60	
47	01NB01AF0005	0.7	41.6	18.0	2.60	0.65	4.2	12.4	11.4	4.60	
48	01NB01AF0005	1.5	24.8	11.0	1.40	0.36	1.6	5.6	5.1	1.50	L10.
49	01NB01AF0005	0.6	39.1	16.0	2.30	0.52	2.9	9.5	8.5	2.90	L10.
50	01NB01AF0005	1.7	35.1	14.0	2.00	0.52	2.4	7.5	6.9	2.10	L10.

TABLE 4
PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (MG/L)
FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS
JANUARY 1988 TO DECEMBER 1988

0	1 STN	12 02073 TURB (JTU)	13 10101 T ALK (MG/L)	14 20110 Ca (MG/L)	15 12107 Mg (MG/L)	16 19103 K (MG/L)	17 11103 Na (MG/L)	18 16304 SO4 (MG/L)	19 16309 SO4 (MG/L)	20 17209 Cl (MG/L)	21 10401 NF RES (MG/L)
51	01NB01AF0005	1.5	28.1	12.0	1.60	0.38	2.0	7.1	6.2	2.00	L10.
52											
53	01NB01AG0001	0.5	41.8	19.0	2.70	0.59	2.3	10.9	9.6	3.20	L10.
54	01NB01AG0001	0.4	40.3	18.0	2.70	0.80	2.9	10.4	9.5	4.20	L10.
55	01NB01AG0001	0.9	18.8	8.6	1.50	0.34	1.3	6.3	5.4	1.50	L10.
56	01NB01AG0001	0.7	52.6	21.0	3.00	0.74	2.7	10.2	9.6	3.30	L10.
57	01NB01AG0001	0.7	46.6	18.0	2.60	0.53	2.6	7.3	6.6	2.90	L10.
58	01NB01AG0001	0.7	44.3	18.0	2.70	0.52	2.6	7.0	6.6	2.90	L10.
59	01NB01AG0001	0.8	44.8	18.0	2.60	0.52	2.6	7.0	6.6	2.90	L10.
60	01NB01AG0001	1.1	28.4	12.0	2.00	0.42	1.8	9.1	8.0	2.20	L10.
61											
62	00NB01AG0003	0.8	120.2	56.0	5.70	0.66	3.1	22.6	22.0	9.50	L10.
63	00NB01AG0003	0.6	119.7	57.0	5.80	0.80	3.4	21.2	20.5	9.30	L10.
64	00NB01AG0003	1.1	83.9	39.0	4.00	0.73	2.6	15.7	15.1	7.30	L10.
65	00NB01AG0003	0.9	109.3	48.0	5.10	0.64	3.1	16.4	16.1	6.90	L10.
66	00NB01AG0003	0.6	94.6	41.0	4.50	0.56	2.9	12.9	12.5	6.80	L10.
67	00NB01AG0003	1.3	101.1	46.0	4.90	0.84	3.3	19.2	19.2	9.10	L10.
68	00NB01AG0003	1.2	103.3	46.0	4.90	0.84	3.3	19.5	19.2	9.10	L10.
69	00NB01AG0003	1.4	103.7	46.0	4.90	0.84	3.3	19.5	19.2	9.00	L10.
70											
71	00NB01AJ0006	0.3	143.0	62.0	5.00	0.95	4.0	20.3	20.0	7.50	L10.
72	00NB01AJ0006	0.3	130.8	59.0	4.80	0.90	4.0	18.2	17.7	9.40	L10.
73	00NB01AJ0006	0.6	88.2	38.0	3.10	0.77	2.6	12.2	12.2	5.20	L10.
74	00NB01AJ0006	0.6	88.6	39.0	3.10	0.77	2.6	12.4	11.9	5.10	
75	00NB01AJ0006	0.6	88.8	38.0	3.10	0.77	2.6	12.4	11.9	5.10	
76	00NB01AJ0006	0.9	141.8	61.0	5.10	1.10	4.1	16.4	16.0	7.90	L10.
77	00NB01AJ0006	0.4	124.1	49.0	5.10	0.71	4.4	12.6	12.5	9.30	L10.
78	00NB01AJ0006	0.7	113.4	46.0	3.90	0.96	3.5	13.5	15.6	7.60	L10.
79											
80	00NB01AJ0029	0.4	74.2	34.0	3.10	0.59	3.9	13.6	13.0	6.30	L10.
81	00NB01AJ0029	0.5	69.4	31.0	3.00	0.65	4.6	14.1	13.3	7.00	L10.
82	00NB01AJ0029	0.6	41.0	19.0	1.80	0.50	2.2	7.9	7.5	3.40	L10.
83	00NB01AJ0029	0.5	83.3	35.0	3.40	0.79	5.3	13.0	12.2	6.90	L10.
84	00NB01AJ0029	0.5	84.0	35.0	3.30	0.80	5.4	13.0	12.2	6.80	L10.
85	00NB01AJ0029	0.5	85.4	34.0	3.40	0.75	5.2	12.8	12.2	7.80	L10.
86	00NB01AJ0029	0.5	69.6	28.0	2.80	0.47	3.2	6.4	5.8	4.80	L10.
87	00NB01AJ0029	0.7	52.5	23.0	2.30	0.60	2.8	9.8	9.6	4.20	L10.

TABLE 5

METAL CONCENTRATIONS (MG/L)

FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS

JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SDATE	3 29305 COPPER (MG/L)	4 82302 LEAD (MG/L)	5 30304 ZINC (MG/L)	6 48302 CADMIUM (MG/L)	7 80315 MERCURY (UG/L)	8 13305 ALUMINUM MG/L	9 13106 DISS. AL MG/L
1	00NB01AD0013	13-JAN-88	L.002	L.002	L.01	L.001	L.02	0.030	0.018
2	00NB01AD0013	24-FEB-88	L.002	L.002	L.01	L.001	L.02	0.016	0.010
3	00NB01AD0013	04-MAY-88	0.004	L.002	L.01	L.001	L.02	0.048	0.025
4	00NB01AD0013	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.027	0.011
5	00NB01AD0013	13-SEP-88	L.002	L.002	L.01	L.001	L.02	0.018	0.010
6	00NB01AD0013	16-NOV-88	L.002	L.002	L.01	L.001	L.02	0.025	0.016
7									
8	00NB01AD0001	13-JAN-88	L.002	L.002	L.01	L.001	L.02	0.040	0.030
9	00NB01AD0001	24-FEB-88	0.002	L.002	L.01	L.001	L.02	0.040	0.028
10	00NB01AD0001	04-MAY-88	0.004	L.002	L.01	L.001	L.02	0.100	0.074
11	00NB01AD0001	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.033	0.020
12	00NB01AD0001	13-SEP-88	L.002	L.002	L.01	L.001	L.02	0.060	0.040
13	00NB01AD0001	16-NOV-88	L.002	L.002	L.01	L.001	L.02	0.110	0.080
14									
15	00NB01AD0008	13-JAN-88	0.002	L.002	L.01	L.001	L.02	0.038	0.025
16	00NB01AD0008	24-FEB-88	L.002	L.002	L.01	L.001	L.02	0.026	L.010
17	00NB01AD0008	04-MAY-88	0.004	L.002	L.01	L.001	L.02	0.042	0.010
18	00NB01AD0008	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.030	0.018
19	00NB01AD0008	13-SEP-88	0.002	L.002	L.01	L.001	0.03	0.085	0.030
20	00NB01AD0008	16-NOV-88	L.002	L.002	L.01	L.001	0.05	0.093	0.065
21									
22	00NB01AD0016	13-JAN-88	0.002	L.002	L.01	L.001	L.02	0.020	L.010
23	00NB01AD0016	24-FEB-88	0.003	L.002	L.01	L.001	L.02	0.042	0.028
24	00NB01AD0016	04-MAY-88	0.002	L.002	L.01	L.001	L.02	0.098	0.070
25	00NB01AD0016	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.035	0.010
26	00NB01AD0016	13-SEP-88	L.002	L.002	L.01	L.001	L.02	0.062	0.010
27	00NB01AD0016	16-NOV-88	L.002	L.002	L.01	L.001	L.02	0.022	L.010
28									
29	00NB01AF0038	13-JAN-88	L.002	L.002	L.01	L.001	L.02	0.048	0.030
30	00NB01AF0038	04-MAY-88	0.004	L.002	L.01	L.001	L.02	0.070	0.032
31	00NB01AF0038	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.065	0.046
32	00NB01AF0038	13-SEP-88	L.002	L.002	L.01	L.001	L.02	0.100	0.058
33	00NB01AF0038	16-NOV-88	L.002	L.002	L.01	L.001	L.02	0.056	0.033
34									
35	00NB01AF0021	13-JAN-88	L.002	L.002	L.01	L.001	L.02	L.010	L.010
36	00NB01AF0021	13-JAN-88	L.002	L.002	L.01	L.001	L.02	L.010	L.010
37	00NB01AF0021	13-JAN-88	L.002	L.002	L.01	L.001	L.02	L.010	L.010
38	00NB01AF0021	24-FEB-88	L.002	L.002	L.01	L.001	L.02	L.010	L.010
39	00NB01AF0021	04-MAY-88	L.002	L.002	L.01	L.001	L.02	0.070	0.016
40	00NB01AF0021	21-JUN-88	L.002	L.002	L.01	L.001	L.02	0.046	0.010
41	00NB01AF0021	13-SEP-88	L.002	L.002	L.01	L.001	L.02	0.012	L.010
42	00NB01AF0021	16-NOV-88	L.002	L.002	L.01	L.001	L.02	0.011	0.010
43									
44	01NB01AF0005	14-JAN-88	L.002	L.002	L.01	L.001	L.02	0.035	0.028
45	01NB01AF0005	25-FEB-88	L.002	L.002	L.01	L.001	L.02	0.046	0.030
46	01NB01AF0005	25-FEB-88	L.002	L.002	L.01	L.001	L.02	0.048	0.032
47	01NB01AF0005	25-FEB-88	0.002	L.002	L.01	L.001	L.02	0.046	0.030
48	01NB01AF0005	04-MAY-88	0.002	L.002	L.01	L.001	L.02	0.120	0.052
49	01NB01AF0005	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.042	0.020
50	01NB01AF0005	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.085	0.034

TABLE 5
METAL CONCENTRATIONS (MG/L)
FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS
JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SDATE	3 29305 COPPER (MG/L)	4 82302 LEAD (MG/L)	5 30304 ZINC (MG/L)	6 48302 CADMIUM (MG/L)	7 80315 MERCURY (UG/L)	8 13305 ALUMINUM MG/L	9 13106 DISS. AL MG/L
51	01NB01AF0005	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.097	0.055
52									
53	01NB01AG0001	12-JAN-88	L.002	L.002	L.01	L.001	L.02	0.035	0.025
54	01NB01AG0001	23-FEB-88	0.002	L.002	L.01	L.001	L.02	0.020	0.012
55	01NB01AG0001	03-MAY-88	0.002	L.002	L.01	L.001	L.02	0.100	0.063
56	01NB01AG0001	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.036	0.023
57	01NB01AG0001	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.060	0.040
58	01NB01AG0001	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.055	0.036
59	01NB01AG0001	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.055	0.040
60	01NB01AG0001	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.110	0.077
61									
62	00NB01AG0003	12-JAN-88	L.002	L.002	L.01	L.001	L.02	0.040	0.010
63	00NB01AG0003	23-FEB-88	L.002	L.002	L.01	L.001	L.02	0.018	L.010
64	00NB01AG0003	03-MAY-88	0.004	L.002	L.01	L.001	L.02	0.075	0.037
65	00NB01AG0003	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.056	0.026
66	00NB01AG0003	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.025	0.020
67	00NB01AG0003	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.057	0.027
68	00NB01AG0003	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.056	0.027
69	00NB01AG0003	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.062	0.023
70									
71	00NB01AJ0006	12-JAN-88	L.002	L.002	L.01	L.001	L.02	0.013	L.010
72	00NB01AJ0006	23-FEB-88	L.002	L.002	L.01	L.001	L.02	L.010	L.010
73	00NB01AJ0006	03-MAY-88	0.004	L.002	L.01	L.001	L.02	0.028	0.024
74	00NB01AJ0006	03-MAY-88	0.005	L.002	L.01	L.001	L.02	0.030	0.019
75	00NB01AJ0006	03-MAY-88	0.004	L.002	L.01	L.001	L.02	0.026	0.016
76	00NB01AJ0006	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.017	L.010
77	00NB01AJ0006	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.010	L.010
78	00NB01AJ0006	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.026	0.012
79									
80	00NB01AJ0029	12-JAN-88	L.002	L.002	L.01	L.001	L.02	0.023	0.015
81	00NB01AJ0029	23-FEB-88	L.002	L.002	L.01	L.001	L.02	0.015	L.010
82	00NB01AJ0029	03-MAY-88	0.002	L.002	L.01	L.001	L.02	0.056	0.035
83	00NB01AJ0029	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.018	0.012
84	00NB01AJ0029	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.019	0.012
85	00NB01AJ0029	20-JUN-88	L.002	L.002	L.01	L.001	L.02	0.020	0.013
86	00NB01AJ0029	12-SEP-88	L.002	L.002	L.01	L.001	L.02	0.033	0.022
87	00NB01AJ0029	15-NOV-88	L.002	L.002	L.01	L.001	L.02	0.049	0.040

TABLE 5

METAL CONCENTRATIONS (MG/L)

FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS

JANUARY 1988 TO DECEMBER 1988

0	1 STN	10 26304 IRON (MG/L)		11 25304 MANGANESE MG/L		0	1 STN	10 26304 IRON (MG/L)		11 25304 MANGANESE MG/L	
1	00NB01AD0013	0.11	L.01			51	01NB01AF0005	0.16		0.02	
2	00NB01AD0013	0.09	L.01			52					
3	00NB01AD0013	0.09	L.01			53	01NB01AG0001	0.09	L.01		
4	00NB01AD0013	0.10	L.01			54	01NB01AG0001	0.07	L.01		
5	00NB01AD0013	0.07	L.01			55	01NB01AG0001	0.09	L.01		
6	00NB01AD0013	0.06		0.01		56	01NB01AG0001	0.06		0.02	
7						57	01NB01AG0001	0.11		0.01	
8	00NB01AD0001	0.07	L.01			58	01NB01AG0001	0.12	L.01		
9	00NB01AD0001	0.07	L.01			59	01NB01AG0001	0.12	L.01		
10	00NB01AD0001	0.10	L.01			60	01NB01AG0001	0.14		0.02	
11	00NB01AD0001	0.06	L.01			61					
12	00NB01AD0001	0.14	L.01			62	00NB01AG0003	0.08		0.01	
13	00NB01AD0001	0.15		0.02		63	00NB01AG0003	0.06	L.01		
14						64	00NB01AG0003	0.07		0.02	
15	00NB01AD0008	0.07	L.01			65	00NB01AG0003	0.05		0.02	
16	00NB01AD0008	0.10		0.02		66	00NB01AG0003	0.12	L.01		
17	00NB01AD0008	0.06	L.01			67	00NB01AG0003	0.12		0.02	
18	00NB01AD0008	0.06		0.08		68	00NB01AG0003	0.12		0.03	
19	00NB01AD0008	0.19		0.06		69	00NB01AG0003	0.13		0.02	
20	00NB01AD0008	0.14		0.02		70					
21						71	00NB01AJ0006		L.01		
22	00NB01AD0016	0.08	L.01			72	00NB01AJ0006		L.01		
23	00NB01AD0016	0.07	L.01			73	00NB01AJ0006			0.01	
24	00NB01AD0016	0.11		0.01		74	00NB01AJ0006		L.01		
25	00NB01AD0016	0.17		0.03		75	00NB01AJ0006			0.01	
26	00NB01AD0016	0.22		0.03		76	00NB01AJ0006	0.07		0.03	
27	00NB01AD0016	0.07		0.02		77	00NB01AJ0006	0.06	L.01		
28						78	00NB01AJ0006	0.06		0.01	
29	00NB01AF0038	0.10		0.06		79					
30	00NB01AF0038	0.08		0.02		80	00NB01AJ0029		L.01		
31	00NB01AF0038	0.25		0.16		81	00NB01AJ0029	0.06	L.01		
32	00NB01AF0038	0.30		0.11		82	00NB01AJ0029		L.01		
33	00NB01AF0038	0.10		0.03		83	00NB01AJ0029			0.02	
34						84	00NB01AJ0029	0.05		0.02	
35	00NB01AF0021		L.01			85	00NB01AJ0029			0.02	
36	00NB01AF0021		L.01			86	00NB01AJ0029	0.07	L.01		
37	00NB01AF0021		L.01			87	00NB01AJ0029	0.09		0.01	
38	00NB01AF0021		L.01								
39	00NB01AF0021	0.08	L.01								
40	00NB01AF0021	0.12		0.02							
41	00NB01AF0021	0.06	L.01								
42	00NB01AF0021	0.07		0.01							
43											
44	01NB01AF0005	0.09		0.03							
45	01NB01AF0005	0.11		0.05							
46	01NB01AF0005	0.10		0.04							
47	01NB01AF0005	0.11		0.04							
48	01NB01AF0005	0.13		0.01							
49	01NB01AF0005	0.13		0.02							
50	01NB01AF0005	0.21		0.03							

TABLE 6

NUTRIENT CONCENTRATIONS (MG/L)

FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS

JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SAMPLE	3 SDATE	4 STIME	5 06107 DOC (MG/L)	6 07110 NO3 NO2 (MG/L)	7 07601 TN (MG/L)	8 15104 TD PHOS (MG/L)	9 15413 T PHOS (MG/L)
1	00NB01AD0013	704056	13-JAN-88	1030	5.6	0.17	0.23	0.001	0.002
2	00NB01AD0013	704373	24-FEB-88	1030	5.8	0.14	0.26	0.005	0.006
3	00NB01AD0013	800386	04-MAY-88	1000	4.9	0.21	0.26	0.007	0.007
4	00NB01AD0013	801101	21-JUN-88	1110	5.6	0.05	0.15	0.005	0.008
5	00NB01AD0013	801972	13-SEP-88	820	4.5	0.01	0.11	0.001	0.011
6	00NB01AD0013	802869	16-NOV-88	805	5.9	0.04	0.16	0.003	0.005
7									
8	00NB01AD0001	704057	13-JAN-88	1130	5.9	0.15	0.27	0.001	0.002
9	00NB01AD0001	704374	24-FEB-88	1150	5.3	0.27	0.39	0.005	0.005
10	00NB01AD0001	800387	04-MAY-88	1100	6.8	0.12	0.20	0.007	0.009
11	00NB01AD0001	801100	21-JUN-88	1010	5.6	0.03	0.12	0.005	0.007
12	00NB01AD0001	801971	13-SEP-88	920	9.0	0.01	0.13		
13	00NB01AD0001	802870	16-NOV-88	910	11.0	0.05	0.17	0.003	0.006
14									
15	00NB01AD0008	704059	13-JAN-88	1330	5.1	0.21	0.32	0.004	0.004
16	00NB01AD0008	704375	24-FEB-88	1420	4.4	0.11	0.23	0.011	0.015
17	00NB01AD0008	800388	04-MAY-88	1240	3.7	0.10	0.23	0.007	0.014
18	00NB01AD0008	801099	21-JUN-88	900	5.2	0.03	0.11	0.006	0.015
19	00NB01AD0008	801970	13-SEP-88	1025	7.7	0.01	0.14	0.019	0.028
20	00NB01AD0008	802871	16-NOV-88	1035	9.4	0.05	0.18	0.010	0.016
21									
22	00NB01AD0016	704058	13-JAN-88	1315	4.3	0.02	0.18	0.006	0.009
23	00NB01AD0016	704376	24-FEB-88	1320	5.1	0.45	0.45	0.047	0.052
24	00NB01AD0016	800389	04-MAY-88	1255	6.3	0.12	0.18	0.014	0.014
25	00NB01AD0016	801098	21-JUN-88	825	4.3	0.05	0.14	0.007	0.019
26	00NB01AD0016	801969	13-SEP-88	1055	3.6	0.01	0.10	0.019	0.024
27	00NB01AD0016	802872	16-NOV-88	1105	3.9	0.02	0.22	0.007	0.010
28									
29	00NB01AF0038	704060	13-JAN-88	1515	7.3	0.10	0.22	0.012	0.020
30	00NB01AF0038	800390	04-MAY-88	1330	4.9	0.09	0.13	0.008	0.014
31	00NB01AF0038	801097	21-JUN-88	755	9.1	0.20	0.43	0.021	0.050
32	00NB01AF0038	801968	13-SEP-88	1145	9.7	0.01	0.13	0.031	0.060
33	00NB01AF0038	802873	16-NOV-88	1135	5.2	0.02	0.21	0.008	0.013
34									
35	00NB01AF0021	704061	13-JAN-88	1600	1.1	0.34	0.37	0.001	0.002
36	00NB01AF0021	704062	13-JAN-88	1605	1.2	0.31	0.35	0.001	0.004
37	00NB01AF0021	704063	13-JAN-88	1610	1.2	0.32	0.36	L.001	0.005
38	00NB01AF0021	704377	24-FEB-88	1550	1.4	0.22	0.28	L.001	0.001
39	00NB01AF0021	800391	04-MAY-88	1355	2.1	0.24	0.25	0.002	0.012
40	00NB01AF0021	801096	21-JUN-88	730	1.7	0.06	0.12	0.007	0.015
41	00NB01AF0021	801967	13-SEP-88	1220	0.9	0.19	0.19	0.002	0.003
42	00NB01AF0021	802874	16-NOV-88	1201	1.4	0.25	0.33	L.001	0.003
43									
44	01NB01AF0005	704064	14-JAN-88	900	5.9	0.24	0.27	0.003	0.008
45	01NB01AF0005	704378	25-FEB-88	1030	6.0	0.14	0.26	0.014	0.030
46	01NB01AF0005	704379	25-FEB-88	1035	6.0	0.29	0.36	0.014	0.025
47	01NB01AF0005	704380	25-FEB-88	1040	5.8	0.29	0.36	0.014	0.024
48	01NB01AF0005	800392	04-MAY-88	1530	6.3	0.11	0.14	0.007	0.021
49	01NB01AF0005	801095	20-JUN-88	1440	5.8	0.07	0.14	0.008	0.025
50	01NB01AF0005	801966	12-SEP-88	1430	7.6	0.03	0.10	0.016	0.033

TABLE 6

NUTRIENT CONCENTRATIONS (MG/L)

FOR THE INTERNATIONAL SAINT JOHN RIVER STATIONS

JANUARY 1988 TO DECEMBER 1988

0	1 STN	2 SAMPLE	3 SDATE	4 STIME	5 06107 DOC (MG/L)	6 07110 NO3 NO2 (MG/L)	7 07601 TN (MG/L)	8 15104 TD PHOS (MG/L)	9 15413 T PHOS (MG/L)
51	01NB01AF0005	802868	15-NOV-88	1420	8.4	0.17	0.20	0.004	0.010
52									
53	01NB01AG0001	704054	12-JAN-88	1630	5.4	0.51	0.62		
54	01NB01AG0001	704371	23-FEB-88	1540	4.4	0.77	0.83	0.033	0.037
55	01NB01AG0001	800384	03-MAY-88	1610	7.2	0.21	0.31	0.013	0.013
56	01NB01AG0001	801093	20-JUN-88	1210	4.9	0.18	0.26	0.012	0.044
57	01NB01AG0001	801494	12-SEP-88	1201	8.6	0.06	0.15	0.016	0.025
58	01NB01AG0001	801495	12-SEP-88	1201	8.9	0.06	0.14	0.019	0.031
59	01NB01AG0001	801496	12-SEP-88	1201	8.6	0.06	0.14	0.025	0.025
60	01NB01AG0001	801497	15-NOV-88	1201	10.0	0.33	0.41	0.011	0.016
61									
62	00NB01AG0003	704055	12-JAN-88	1730	2.2	3.00	3.10		
63	00NB01AG0003	704372	23-FEB-88	1630	2.4	2.70	3.20	0.024	0.025
64	00NB01AG0003	800385	03-MAY-88	1630	4.0	2.00	2.00	0.011	0.017
65	00NB01AG0003	801094	20-JUN-88	1240	4.1	1.50	1.50	0.020	0.030
66	00NB01AG0003	801965	12-SEP-88	1330	7.0	0.90	0.95	0.008	0.011
67	00NB01AG0003	802865	15-NOV-88	1305	5.8	2.00	2.00	0.010	0.022
68	00NB01AG0003	802866	15-NOV-88	1310	5.9	2.00	2.00	0.012	0.024
69	00NB01AG0003	802867	15-NOV-88	1315	5.9	1.80	1.80		0.015
70									
71	00NB01AJ0006	704053	12-JAN-88	1330	2.0	2.30	2.60	0.007	0.009
72	00NB01AJ0006	704370	23-FEB-88	1415	1.9	2.00	2.30	0.014	0.016
73	00NB01AJ0006	800381	03-MAY-88	1430	3.6	1.10	1.10	0.005	0.010
74	00NB01AJ0006	800382	03-MAY-88	1432	3.4	1.00	1.10	0.005	0.009
75	00NB01AJ0006	800383	03-MAY-88	1434	3.3	1.00	1.00	0.006	0.009
76	00NB01AJ0006	801092	20-JUN-88	1055	2.9	0.60	0.95	0.008	0.025
77	00NB01AJ0006	801963	12-SEP-88	1100	3.5	0.43	0.46		
78	00NB01AJ0006	802863	15-NOV-88	1125	4.2	1.20	1.40	0.006	0.009
79									
80	00NB01AJ0029	704052	12-JAN-88	1430	3.0	0.60	0.83	0.014	0.016
81	00NB01AJ0029	704369	23-FEB-88	1300	3.1	0.52	0.74	0.016	0.019
82	00NB01AJ0029	800380	03-MAY-88	1330	5.4	0.30	0.40	0.004	0.007
83	00NB01AJ0029	801089	20-JUN-88	925	3.5	0.16	0.23		
84	00NB01AJ0029	801090	20-JUN-88	927	3.7	0.16	0.20	0.010	0.016
85	00NB01AJ0029	801091	20-JUN-88	929	3.5	0.17	0.25	0.009	0.015
86	00NB01AJ0029	801962	12-SEP-88	945	6.6 L.01		0.11	0.006	0.008
87	00NB01AJ0029	802862	15-NOV-88	1000	7.3	0.38	0.39	0.007	0.009

TABLE 7
DISTILLED WATER BLANKS FOR PHOSPHORUS AND METALS FOR 1988

0	1 STN	2 SAMPLE	3 SDATE	4 STIME	5 SUBID	6 T. DISS PHOSPHORUS MG/L		7 TOTAL PHOSPHORUS MG/L		8 EXT. COPPER MG/L	9 EXT. LEAD MG/L	10 EXT. ZINC MG/L	11 EXT. CADMIUM MG/L
1	01NB01AF9905	704065	14-JAN-88	1201	205			L.001		L.002	L.002	L.01	L.001
2	01NB01AF9905	704381	25-FEB-88	1100	205			L.001		L.002	L.002	L.01	L.001
3	01NB01AF9905	800393	04-MAY-88	1201	205				0.001	L.002	L.002	L.01	L.001
4	01NB01AF9905	801102	20-JUN-88	1201	205		0.001		0.002	L.002	L.002	L.01	L.001
5	01NB01AF9905	801975	13-SEP-88	1201	205		0.001		0.007	L.002	L.002	L.01	L.001
6	01NB01AF9905	802875	16-NOV-88	1210	205	L.001		L.001		L.002	L.002	L.01	L.001

0	12 EXT. MERCURY MG/L	13 EXT. ALUMINUM MG/L	14 DISS. ALUMINUM MG/L	15 EXT IRON MG/L	16 EXT. MANGANESE MG/L
1	L.02	L.010			L.01
2	L.02	L.010			L.01
3	L.02	L.01			L.01
4	L.02	L.010	L.010	0.05	L.01
5	L.02	L.010	L.010		L.01
6		L.010	L.010		L.01

TABLE 8
MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE AROOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

0	1 STN	2 SAMPLE	3 SDATE	4 DISCHARGE WASHBURN CFS	5 DISCHARGE TINKER CMS	6 10301 pH (UNITS)	7 02041 SP COND (USIE/CM)	8 02011 COLOR (UNITS)	9 02073 TURB (JTU)	10 10101 T ALK (MG/L)
1	01NB01AG0001	801494	28-JUN-88	348	13.8156	7.9	160	15	1.7	57.3
2	01NB01AG0001	801495	29-JUN-88	354	14.0538	7.2	161	10	1.7	56.3
3	01NB01AG0001	801496	30-JUN-88	359	14.2523	7.5	165	15	1.8	58.1
4	01NB01AG0001	801497	01-JUL-88	473	18.7781	7.0	168	10	1.8	59.6
5	01NB01AG0001	801498	02-JUL-88	1280	50.8160	7.5	162	15	2.2	58.2
6	01NB01AG0001	801499	03-JUL-88	2000	79.4000	7.6	150	20	1.6	55.2
7	01NB01AG0001	801500	04-JUL-88	2020	80.1940	7.6	122	15	0.5	41.5
8	01NB01AG0001	801501	05-JUL-88	1680	66.6960	7.0	101	55	3.3	35.6
9	01NB01AG0001	801502	06-JUL-88	1370	54.3890	7.3	90	40	2.0	30.5
10	01NB01AG0001	801503	07-JUL-88	1080	42.8760	7.3	86	50	2.4	30.3
11	01NB01AG0001	801504	08-JUL-88	881	34.9757	7.3	89	50	1.9	31.8
12	01NB01AG0001	801505	09-JUL-88	739	29.3383	7.4	92	40	1.6	32.9
13	01NB01AG0001	801506	10-JUL-88	675	26.7975	7.5	95	30	1.0	33.6
14	01NB01AG0001	801507	11-JUL-88	1050	41.6850	7.4	97	30	1.2	34.4
15	01NB01AG0001	801508	12-JUL-88	1720	68.2840	7.3	101	30	1.0	41.0
16	01NB01AG0001	801509	13-JUL-88	1900	75.4300	7.4	110	30	1.2	42.3
17	01NB01AG0001	801510	14-JUL-88	1540	61.1380	6.9	95	20	1.0	35.6
18	01NB01AG0001	801511	15-JUL-88	1260	50.0220	7.3	89	35	0.9	36.8
19	01NB01AG0001	801512	16-JUL-88	1190	47.2430	7.2	91	50	1.4	34.9
20	01NB01AG0001	801513	17-JUL-88	1180	46.8460	7.2	94	50	1.3	35.5
21	01NB01AG0001	801514	18-JUL-88	1060	42.0820	7.2	93	50	1.0	35.3
22	01NB01AG0001	801515	19-JUL-88	907	36.0079	7.1	94	50	1.2	35.7
23	01NB01AG0001	801516	20-JUL-88	914	36.2858	7.3	94	50	1.2	35.1
24	01NB01AG0001	801517	21-JUL-88	950	37.7150	7.2	99	50	2.1	36.6
25	01NB01AG0001	801745	22-JUL-88	861	34.1817	7.3	109	60	2.6	42.9
26	01NB01AG0001	801746	23-JUL-88	713	28.3061	7.3	105	60	2.7	40.4
27	01NB01AG0001	801747	24-JUL-88	600	23.8200	7.3	106	40	1.1	44.0
28	01NB01AG0001	801748	25-JUL-88	520	20.6440	7.3	106	40	1.6	40.0
29	01NB01AG0001	801749	26-JUL-88	485	19.2545	7.3	107	40	1.2	39.7
30	01NB01AG0001	801750	27-JUL-88	439	17.4283	7.5	108	35	0.7	41.3
31	01NB01AG0001	801751	28-JUL-88	398	15.8006	7.5	112	35	0.9	42.5
32	01NB01AG0001	801752	29-JUL-88	408	16.1976	7.4	113	40	1.5	41.9
33	01NB01AG0001	801753	30-JUL-88	406	16.1182	7.4	114	30	0.5	43.9
34	01NB01AG0001	801754	31-JUL-88	405	16.0785	7.6	112	30	0.9	39.1
35	01NB01AG0001	801755	01-AUG-88	405	16.0785	7.5	119	20	0.7	44.4
36	01NB01AG0001	801756	02-AUG-88	395	15.6815	7.3		20	0.9	
37	01NB01AG0001	801757	03-AUG-88	328	13.0216	7.4	124	20	0.8	45.1
38	01NB01AG0001	801758	04-AUG-88	477	18.9369	7.3	125	30	0.9	
39	01NB01AG0001	801759	05-AUG-88	867	34.4199	7.3	124	15	0.9	
40	01NB01AG0001	801760	06-AUG-88	816	32.3952	7.3	126	15	0.9	
41	01NB01AG0001	801761	07-AUG-88	973	38.6281	7.4	133	15	0.9	50.4
42	01NB01AG0001	801762	08-AUG-88	1610	63.9170	7.4	125	10	0.5	48.4
43	01NB01AG0001	801763	09-AUG-88	1620	64.3140	7.3	116	50	0.8	43.4
44	01NB01AG0001	801764	10-AUG-88	1490	59.1530	7.2	98	55	0.6	37.4
45	01NB01AG0001	801765	11-AUG-88	1280	50.8160	7.2	98	60	1.0	35.7
46	01NB01AG0001	801766	12-AUG-88	1020	40.4940	7.3	95	75	1.8	34.3
47	01NB01AG0001	801767	13-AUG-88	822	32.6334	7.3	96	70	1.4	35.5
48	01NB01AG0001	801768	14-AUG-88	687	27.2739	7.1	96	55	1.5	36.0
49	01NB01AG0001	801903	17-AUG-88	2180	86.5460	7.7	121	45	2.4	45.1
50	01NB01AG0001	801904	18-AUG-88	2180	86.5460	7.7	114	50	1.6	43.7

TABLE 8

MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE ARDOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

0	1 STN	3 SDATE	11 20110 CALCIUM MG/L	12 12107 MAGNESIUM MG/L	13 19103 K (MG/L)	14 11103 Na (MG/L)	15 16304 SO4 (MG/L)	16 16309 SO4 (MG/L)	17 17209 Cl (MG/L)	18 DISS.ORG CARBON MG/L
1	01NB01AG0001	28-JUN-88	24	3.3	0.84	3.2	10.90		4.5	4.0
2	01NB01AG0001	29-JUN-88	24	3.3	0.89	3.3	11.04		4.6	4.1
3	01NB01AG0001	30-JUN-88	24	3.3	0.91	3.4	11.24		4.7	3.8
4	01NB01AG0001	01-JUL-88	25	3.3	0.90	3.4	11.58		4.9	4.1
5	01NB01AG0001	02-JUL-88	24	3.3	0.83	3.3	10.94		4.6	4.7
6	01NB01AG0001	03-JUL-88	23	3.3	0.67	2.9	9.57		3.9	6.0
7	01NB01AG0001	04-JUL-88	18	2.6	0.58	2.7	8.34		3.1	5.9
8	01NB01AG0001	05-JUL-88	15	2.4	0.48	2.3	7.19			8.4
9	01NB01AG0001	06-JUL-88	13	2.2	0.41	1.9	7.01		2.0	9.2
10	01NB01AG0001	07-JUL-88	13	2.1	0.40	1.9	6.75		1.8	8.4
11	01NB01AG0001	08-JUL-88	13	2.1	0.45	1.9	8.51		1.9	8.2
12	01NB01AG0001	09-JUL-88	14	2.2	0.47	2.2	6.85		2.1	8.4
13	01NB01AG0001	10-JUL-88	14	2.3	0.49	2.1	7.14		2.1	8.2
14	01NB01AG0001	11-JUL-88	14	2.3	0.49	2.1	7.14		5.0	8.1
15	01NB01AG0001	12-JUL-88	15	2.4	0.53	2.1	7.14		2.1	8.1
16	01NB01AG0001	13-JUL-88	17	2.6	0.56	2.3	7.49		2.5	7.6
17	01NB01AG0001	14-JUL-88	14	2.3	0.50	2.1	6.57		2.1	7.3
18	01NB01AG0001	15-JUL-88	13	2.3	0.90	2.0	6.25		1.8	9.2
19	01NB01AG0001	16-JUL-88	14	2.3	0.51	2.0	6.57		1.8	10.0
20	01NB01AG0001	17-JUL-88	14	2.4	0.50	2.0	6.60		2.0	11.0
21	01NB01AG0001	18-JUL-88	14	2.4	0.49	1.9	6.43		1.9	11.0
22	01NB01AG0001	19-JUL-88	14	2.4	0.47	1.9	6.43		1.9	11.0
23	01NB01AG0001	20-JUL-88	14	2.4	0.47	2.0	6.43		1.9	10.0
24	01NB01AG0001	21-JUL-88	15	2.5	0.47	2.2	6.60		2.3	9.6
25	01NB01AG0001	22-JUL-88	16	2.5	0.51	2.2	6.70	6.2	2.6	8.7
26	01NB01AG0001	23-JUL-88	16	2.5	0.52	2.2	6.50	6.2	2.6	8.7
27	01NB01AG0001	24-JUL-88	16	2.5	0.59	2.5	6.90	6.3	2.6	8.4
28	01NB01AG0001	25-JUL-88	16	2.5	0.54	2.2	6.70	6.3	2.6	8.6
29	01NB01AG0001	26-JUL-88	16	2.6	0.54	2.2	6.60	6.3	2.6	8.4
30	01NB01AG0001	27-JUL-88	16	2.6	0.55	2.3	6.70	6.4	2.6	8.2
31	01NB01AG0001	28-JUL-88	17	2.7	0.57	2.4	7.10	6.7	2.9	8.1
32	01NB01AG0001	29-JUL-88	17	2.7	0.57	2.4	7.10	6.8	3.0	8.1
33	01NB01AG0001	30-JUL-88	17	2.7	0.59	2.6	7.50	7.0	3.2	7.8
34	01NB01AG0001	31-JUL-88	16	2.7	0.65	2.6	7.60	7.2	3.3	7.9
35	01NB01AG0001	01-AUG-88	18	2.8	0.65	2.8	7.70	7.3	3.8	
36	01NB01AG0001	02-AUG-88	18	2.9	0.69	2.9		7.5	3.9	7.3
37	01NB01AG0001	03-AUG-88	18	2.9	0.69	2.9	7.90	7.6	3.4	7.1
38	01NB01AG0001	04-AUG-88	18	2.9	0.74	3.2	7.70	7.8	4.1	7.0
39	01NB01AG0001	05-AUG-88	18	2.9	0.75	3.2	7.80	7.9	3.9	6.7
40	01NB01AG0001	06-AUG-88	18	2.9	0.84	3.5	8.50	8.2	4.6	6.4
41	01NB01AG0001	07-AUG-88	19	3.0	0.64	3.5	8.10	8.2	4.3	5.9
42	01NB01AG0001	08-AUG-88	18	2.9	0.69	3.1	7.10	7.1	3.5	6.2
43	01NB01AG0001	09-AUG-88	18	2.6	0.65	2.6		6.5	3.1	10.3
44	01NB01AG0001	10-AUG-88	15	2.3	0.60	2.2		5.9	2.4	11.1
45	01NB01AG0001	11-AUG-88	15	2.3	0.57	2.2	6.40	6.0	2.7	11.5
46	01NB01AG0001	12-AUG-88	15	2.3	0.55	2.1	6.30	6.3	2.3	11.0
47	01NB01AG0001	13-AUG-88	14	2.3	0.50	2.2	5.80	5.9	2.5	11.6
48	01NB01AG0001	14-AUG-88	14	2.3	0.54	2.2	6.40	5.9	2.4	11.2
49	01NB01AG0001	17-AUG-88	18	2.7	0.49	2.7	6.90	7.1	3.2	6.8
50	01NB01AG0001	18-AUG-88	17	2.5	0.60	3.0	6.00	6.3	3.6	7.8

TABLE 8
MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE AROOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

0	1 STN	2 SAMPLE	3 SDATE	4 DISCHARGE WASHBURN CFS	5 DISCHARGE TINKER CMS	6 10301 pH (UNITS)	7 02041 SP COND (USIE/CM)	8 02011 COLOR (UNITS)	9 02073 TURB (JTU)	10 10101 T ALK (MG/L)
51	01NB01AG0001	B01905	19-AUG-88	1760	69.8720	7.5	92	70	1.6	35.0
52	01NB01AG0001	B01906	20-AUG-88	1400	55.5800	7.5	86	70	1.1	32.9
53	01NB01AG0001	B01907	21-AUG-88	1100	43.6700	7.5	86	75	1.6	33.5
54	01NB01AG0001	B01908	22-AUG-88	904	35.8888	7.4	90	80	1.8	34.0
55	01NB01AG0001	B01909	23-AUG-88	769	30.5293	6.9	79	55	0.5	22.3
56	01NB01AG0001	B01910	24-AUG-88	676	26.8372	7.4	95	60	0.8	35.6
57	01NB01AG0001	B01911	26-AUG-88	691	27.4327	7.4	114	45	0.8	42.9
58	01NB01AG0001	B01912	27-AUG-88	866	34.3802	7.6	125	35	0.5	48.9
59	01NB01AG0001	B01913	28-AUG-88	1070	42.4790	7.5	118	40	0.7	44.3
60	01NB01AG0001	B01914	29-AUG-88	1040	41.2880	7.7	119	40	0.8	44.8
61	01NB01AG0001	B01915	30-AUG-88	955	37.9135	7.5	110	55	0.6	42.3
62	01NB01AG0001	B01916	31-AUG-88	939	37.2783	7.6	104	50	0.5	39.9
63	01NB01AG0001	B01917	01-SEP-88	927	36.8019	7.8	103	50	0.6	38.7
64	01NB01AG0001	B01918	02-SEP-88	829	32.9113	7.4	102	45	0.5	39.4
65	01NB01AG0001	B01919	03-SEP-88	709	28.1473	7.4	104	40	0.4	40.6
66	01NB01AG0001	B01920	04-SEP-88	618	24.5346	7.5	105	40	0.5	40.7
67	01NB01AG0001	B01921	05-SEP-88	575	22.8275	7.4	104	45	0.4	39.7
68	01NB01AG0001	B01922	06-SEP-88	654	25.9638	7.5	106	45	0.5	40.6
69	01NB01AG0001	B01923	07-SEP-88	684	27.1548	7.5	111	40	0.7	43.0
70	01NB01AG0001	B01924	08-SEP-88	655	26.0035	7.5	121	45	0.9	47.9
71	01NB01AG0001	B01925	09-SEP-88	576	22.8672	7.4	119	45	0.9	47.4

TABLE 8
MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE AROOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

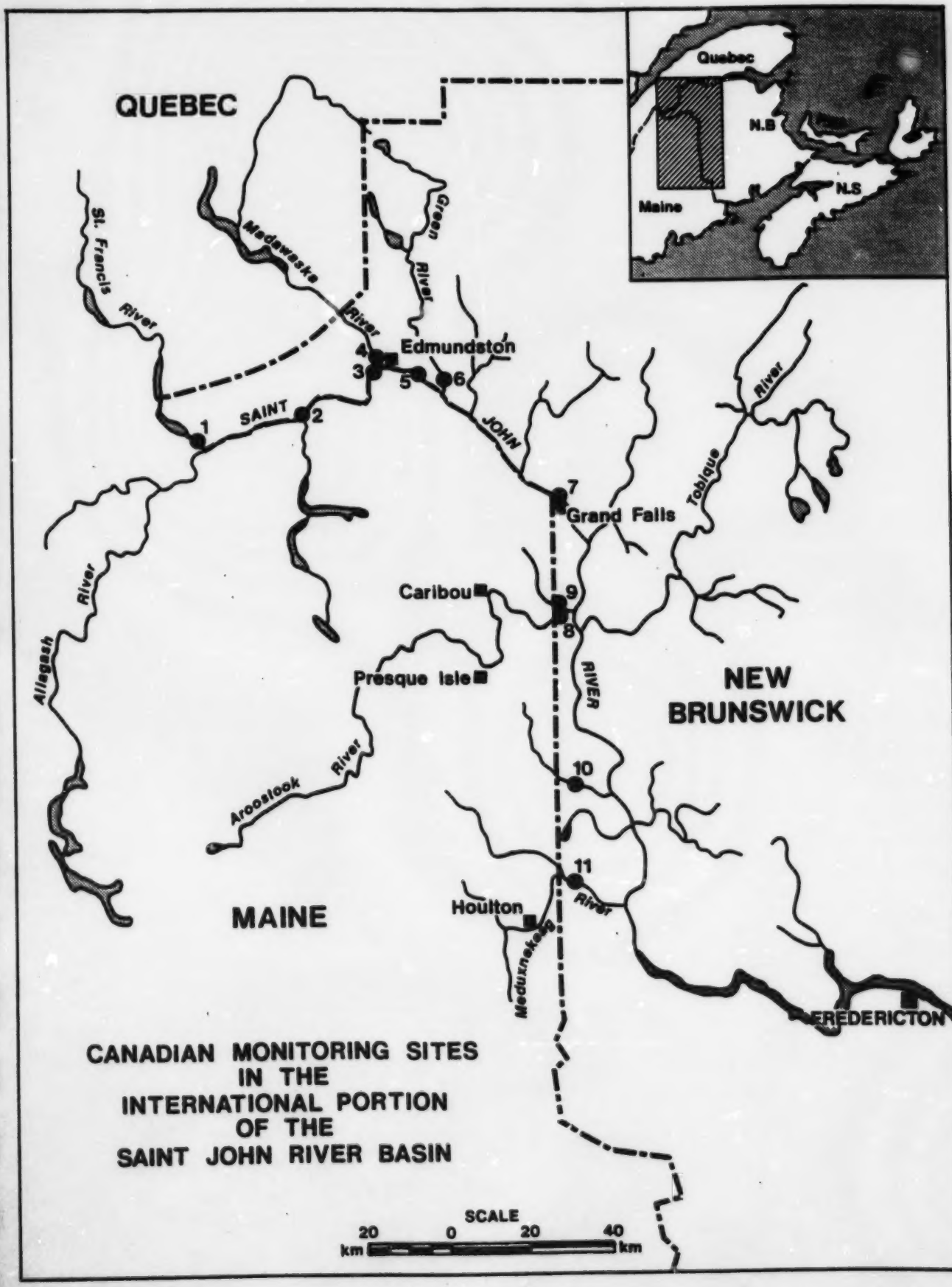
0	1 STN	3 SDATE	11 20110 CALCIUM MG/L	12 12107 MAGNESIUM MG/L	13 19103 K (MG/L)	14 11103 Na (MG/L)	15 16304 SO4 (MG/L)	16 16309 SO4 (MG/L)	17 17209 Cl (MG/L)	18 DISS.ORG CARBON MG/L
51	01NB01AG0001	19-AUG-88	14	2.3	0.51	2.2	5.70	5.4	2.4	10.6
52	01NB01AG0001	20-AUG-88	13	2.2	0.47	2.0	5.40	5.3	1.8	10.4
53	01NB01AG0001	21-AUG-88	13	2.2	0.48	2.0	5.60	5.3	1.7	11.9
54	01NB01AG0001	22-AUG-88	13	2.3	0.49	2.0	5.60	5.7	1.7	12.2
55	01NB01AG0001	23-AUG-88	11	2.2	0.39	1.9	11.00	9.9	2.0	12.2
56	01NB01AG0001	24-AUG-88	14	2.3	0.50	2.2	6.20	6.1	2.1	11.7
57	01NB01AG0001	26-AUG-88	17	2.6	0.58	2.8	6.70	7.1	3.3	8.9
58	01NB01AG0001	27-AUG-88	19	2.8	0.60	2.7	7.60	8.0	3.2	7.2
59	01NB01AG0001	28-AUG-88	18	2.5	0.55	2.5	7.20	7.2	3.0	7.9
60	01NB01AG0001	29-AUG-88	18	2.6	0.56	2.7	7.00	7.1	3.1	8.0
61	01NB01AG0001	30-AUG-88	16	2.4	0.56	2.6	6.60	6.8	2.9	9.3
62	01NB01AG0001	31-AUG-88	16	2.4	0.53	2.4	6.50	6.4	2.5	8.9
63	01NB01AG0001	01-SEP-88	15	2.4	0.53	2.4	6.50	6.5	2.5	8.7
64	01NB01AG0001	02-SEP-88	15	2.3	0.51	2.4	6.50	6.1	2.5	8.8
65	01NB01AG0001	03-SEP-88	15	2.4	0.52	2.4	6.30	6.2	2.5	8.7
66	01NB01AG0001	04-SEP-88	15	2.4	0.53	2.5	6.50	6.2	2.8	8.5
67	01NB01AG0001	05-SEP-88	15	2.4	0.53	2.4	6.50	6.2	2.6	8.5
68	01NB01AG0001	06-SEP-88	15	2.4	0.54	2.5	6.50	6.1	2.7	8.2
69	01NB01AG0001	07-SEP-88	16	2.5	0.48	2.5	6.60	6.4	2.7	7.9
70	01NB01AG0001	08-SEP-88	18	2.6	0.50	2.5	6.90	6.6	3.0	7.8
71	01NB01AG0001	09-SEP-88	18	2.6	0.52	2.5	6.70	6.2	2.9	8.5

TABLE 8
MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE AROOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

0	1 STN	3 SDATE	19 NITRATE NITROGEN MG/L	20 TOTAL NITROGEN MG/L	21 TOTAL PHOSPHORUS MG/L	22 LOADING NO3-KG/D	23 LOADING TN-KG/D	24 LOADING TP-KG/D	25 TN/TP RATIO
1	01NB01AG0001	28-JUN-88	0.58	0.63	0.045	692	752	54	14
2	01NB01AG0001	29-JUN-88	0.62	0.66	0.045	753	801	55	15
3	01NB01AG0001	30-JUN-88	0.61	0.61	0.039	751	751	48	16
4	01NB01AG0001	01-JUL-88	0.62	0.64	0.045	1006	1038	73	14
5	01NB01AG0001	02-JUL-88	0.59	0.61	0.048	2590	2678	211	13
6	01NB01AG0001	03-JUL-88	0.51	0.58	0.033	3499	3979	226	18
7	01NB01AG0001	04-JUL-88	0.34	0.38	0.012	2356	2633	83	32
8	01NB01AG0001	05-JUL-88	0.25	0.22	0.024	1441	1268	138	9
9	01NB01AG0001	06-JUL-88	0.14	0.22	0.014	658	1034	66	16
10	01NB01AG0001	07-JUL-88	0.20	0.25	0.019	741	926	70	13
11	01NB01AG0001	08-JUL-88	0.19	0.25	0.021	574	755	63	12
12	01NB01AG0001	09-JUL-88	0.20	0.25	0.017	507	634	43	15
13	01NB01AG0001	10-JUL-88	0.13	0.20	0.015	301	463	35	13
14	01NB01AG0001	11-JUL-88	0.13	0.20	0.009	468	720	32	22
15	01NB01AG0001	12-JUL-88	0.11	0.19	0.009	649	1121	53	21
16	01NB01AG0001	13-JUL-88	0.13	0.19	0.012	847	1238	78	16
17	01NB01AG0001	14-JUL-88	0.08	0.15	0.009	423	792	48	17
18	01NB01AG0001	15-JUL-88	0.08	0.15	0.009	346	648	39	17
19	01NB01AG0001	16-JUL-88	0.10	0.17	0.013	408	694	53	13
20	01NB01AG0001	17-JUL-88	0.10	0.18	0.016	405	729	65	11
21	01NB01AG0001	18-JUL-88	0.13	0.20	0.016	473	727	58	13
22	01NB01AG0001	19-JUL-88	0.11	0.19	0.015	342	591	47	13
23	01NB01AG0001	20-JUL-88	0.08	0.15	0.019	251	470	60	8
24	01NB01AG0001	21-JUL-88	0.09	0.16	0.015	293	521	49	11
25	01NB01AG0001	22-JUL-88	0.27	0.41	0.022	797	1211	65	19
26	01NB01AG0001	23-JUL-88	0.22	0.42	0.021	538	1027	51	20
27	01NB01AG0001	24-JUL-88	0.11	0.36	0.013	226	741	27	28
28	01NB01AG0001	25-JUL-88	0.15	0.29	0.016	268	517	29	18
29	01NB01AG0001	26-JUL-88	0.11	0.32	0.017	183	532	28	19
30	01NB01AG0001	27-JUL-88	0.30	0.30	0.015	452	452	23	20
31	01NB01AG0001	28-JUL-88	0.29	0.29	0.009	396	396	12	32
32	01NB01AG0001	29-JUL-88	0.30	0.30	0.025	420	420	35	12
33	01NB01AG0001	30-JUL-88	0.17	0.30	0.022	237	418	31	14
34	01NB01AG0001	31-JUL-88	0.70	0.71	0.070	972	986	97	10
35	01NB01AG0001	01-AUG-88	0.28	0.18	0.016	389	250	22	11
36	01NB01AG0001	02-AUG-88		0.19	0.027		257	37	7
37	01NB01AG0001	03-AUG-88	0.13	0.15	0.020	146	169	23	8
38	01NB01AG0001	04-AUG-88	0.05	0.16	0.021	82	262	34	8
39	01NB01AG0001	05-AUG-88	0.01	0.13	0.020	30	387	59	7
40	01NB01AG0001	06-AUG-88	0.23	0.13	0.019	644	364	53	7
41	01NB01AG0001	07-AUG-88	0.01	0.17	0.022	33	567	73	8
42	01NB01AG0001	08-AUG-88	0.04	0.16	0.018	221	884	99	9
43	01NB01AG0001	09-AUG-88	0.17	0.25	0.017	945	1389	94	15
44	01NB01AG0001	10-AUG-88	0.13	0.22	0.015	664	1124	77	15
45	01NB01AG0001	11-AUG-88	0.10	0.22	0.016	439	966	70	14
46	01NB01AG0001	12-AUG-88	0.23	0.20	0.019	805	700	66	11
47	01NB01AG0001	13-AUG-88	0.18	0.18	0.016	508	508	45	11
48	01NB01AG0001	14-AUG-88	0.13	0.15	0.020	306	353	47	8
49	01NB01AG0001	17-AUG-88	0.35	0.42	0.026	2617	3141	194	16
50	01NB01AG0001	18-AUG-88	0.23	0.32	0.020	1720	2393	150	16

TABLE 8
MAJOR ION AND NUTRIENT DATA FOR DAILY SAMPLES
FROM THE ARDOSTOOK RIVER AT TINKER DAM
JUN 28 TO SEP 9,1990

0	1 STN	3 SDATE	19 NITRATE NITROGEN MG/L	20 TOTAL NITROGEN MG/L	21 TOTAL PHOSPHORUS MG/L	22 LOADING NO3-KG/D	23 LOADING TN-KG/D	24 LOADING TP-KG/D	25 TN/TP RATIO
51	01NB01AG0001	19-AUG-88	0.23	0.28	0.018	1388	1690	109	16
52	01NB01AG0001	20-AUG-88	0.18	0.25	0.016	864	1201	77	16
53	01NB01AG0001	21-AUG-88	0.21	0.27	0.018	792	1019	68	15
54	01NB01AG0001	22-AUG-88	0.09	0.27	0.026	279	837	81	10
55	01NB01AG0001	23-AUG-88	0.37	0.43	0.016	976	1134	42	27
56	01NB01AG0001	24-AUG-88	0.10	0.26	0.014	232	603	32	19
57	01NB01AG0001	26-AUG-88	0.08	0.24	0.010	190	569	24	24
58	01NB01AG0001	27-AUG-88	0.26	0.36	0.011	772	1069	33	33
59	01NB01AG0001	28-AUG-88	0.16	0.29	0.011	387	1064	40	26
60	01NB01AG0001	29-AUG-88	0.23	0.27	0.014	820	963	50	19
61	01NB01AG0001	30-AUG-88	0.06	0.16	0.007	197	524	23	23
62	01NB01AG0001	31-AUG-88	0.16	0.18	0.012	515	580	39	15
63	01NB01AG0001	01-SEP-88	0.15	0.17	0.016	477	541	51	11
64	01NB01AG0001	02-SEP-88	0.01	0.14	0.009	28	398	26	16
65	01NB01AG0001	03-SEP-88	0.01	0.15	0.009	24	365	22	17
66	01NB01AG0001	04-SEP-88	0.05	0.15	0.014	106	318	30	11
67	01NB01AG0001	05-SEP-88	0.01	0.14	0.011	20	276	22	13
68	01NB01AG0001	06-SEP-88	0.03	0.14	0.013	67	314	29	11
69	01NB01AG0001	07-SEP-88	0.01	0.15	0.011	23	352	26	14
70	01NB01AG0001	08-SEP-88	0.16	0.20	0.010	359	449	22	20
71	01NB01AG0001	09-SEP-88	0.10	0.17	0.015	198	336	30	11



CANADIAN MONITORING SITES
IN THE
INTERNATIONAL PORTION
OF THE
SAINT JOHN RIVER BASIN

FIGURE 2
MAJOR COMPONENTS OF A BOX AND WHISKER PLOT

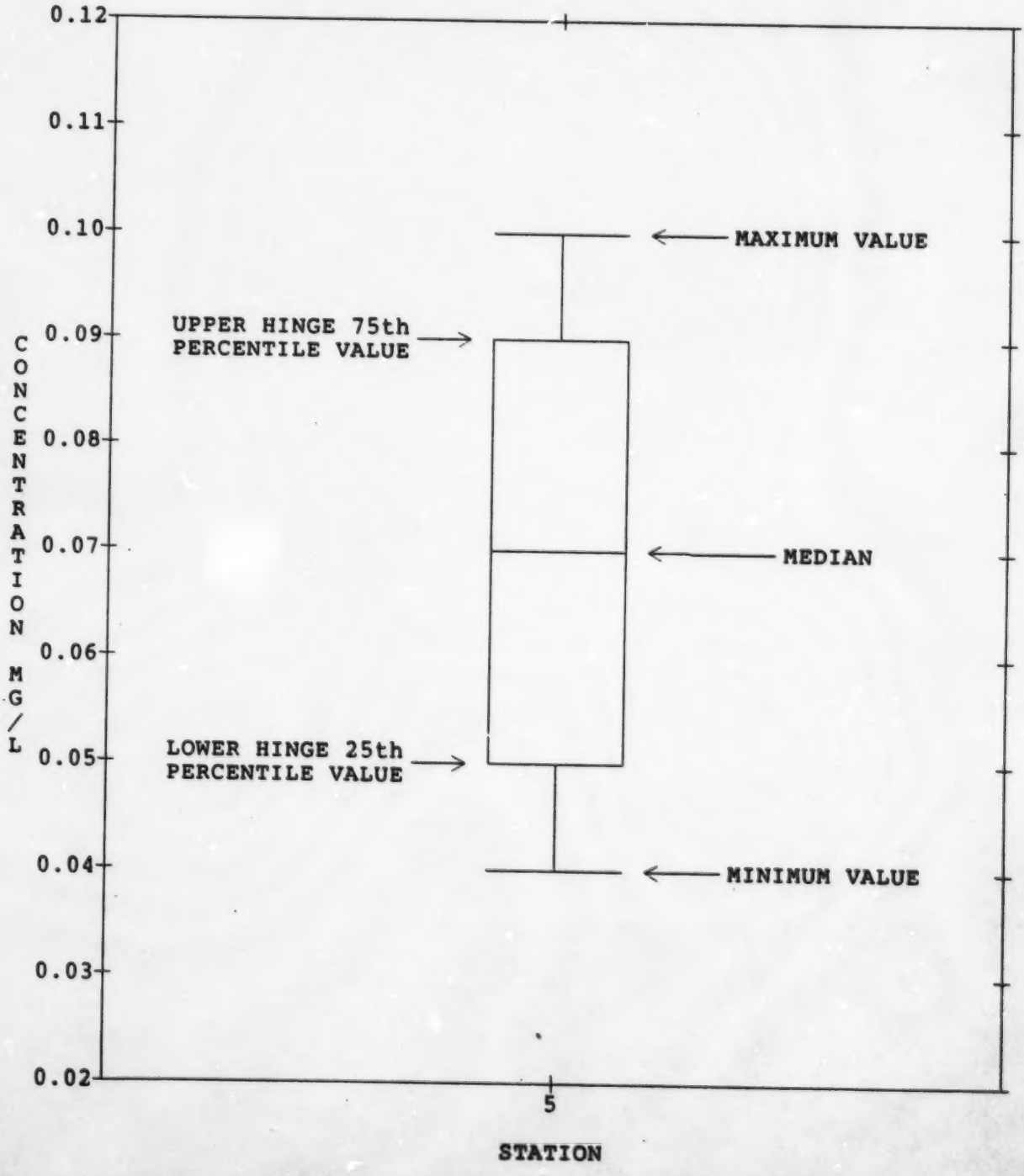


FIGURE 3
TEMPERATURE (DEG. C) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN BASIN - 1988

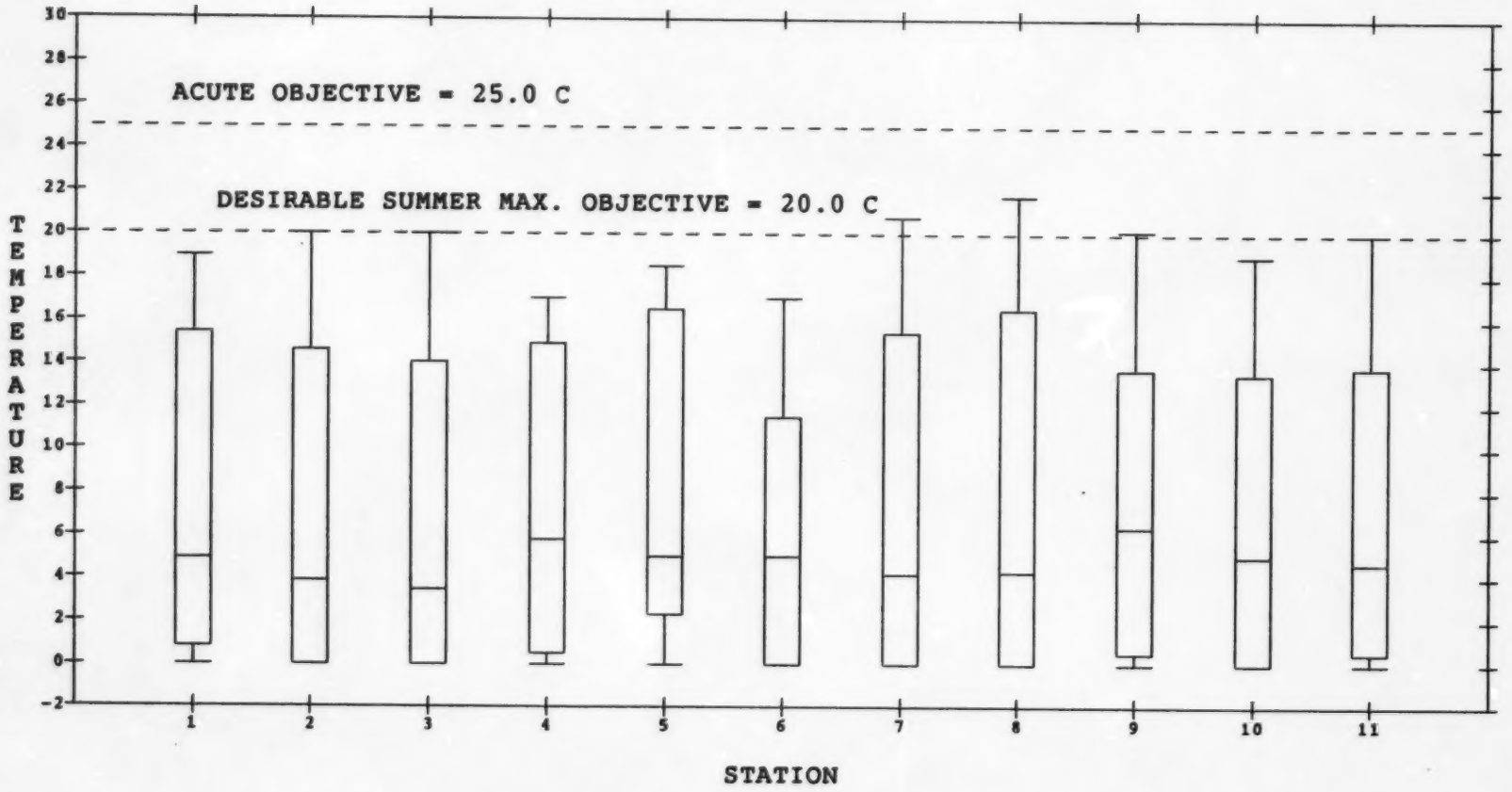


FIGURE 4
DISSOLVED OXYGEN (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN BASIN - 1988

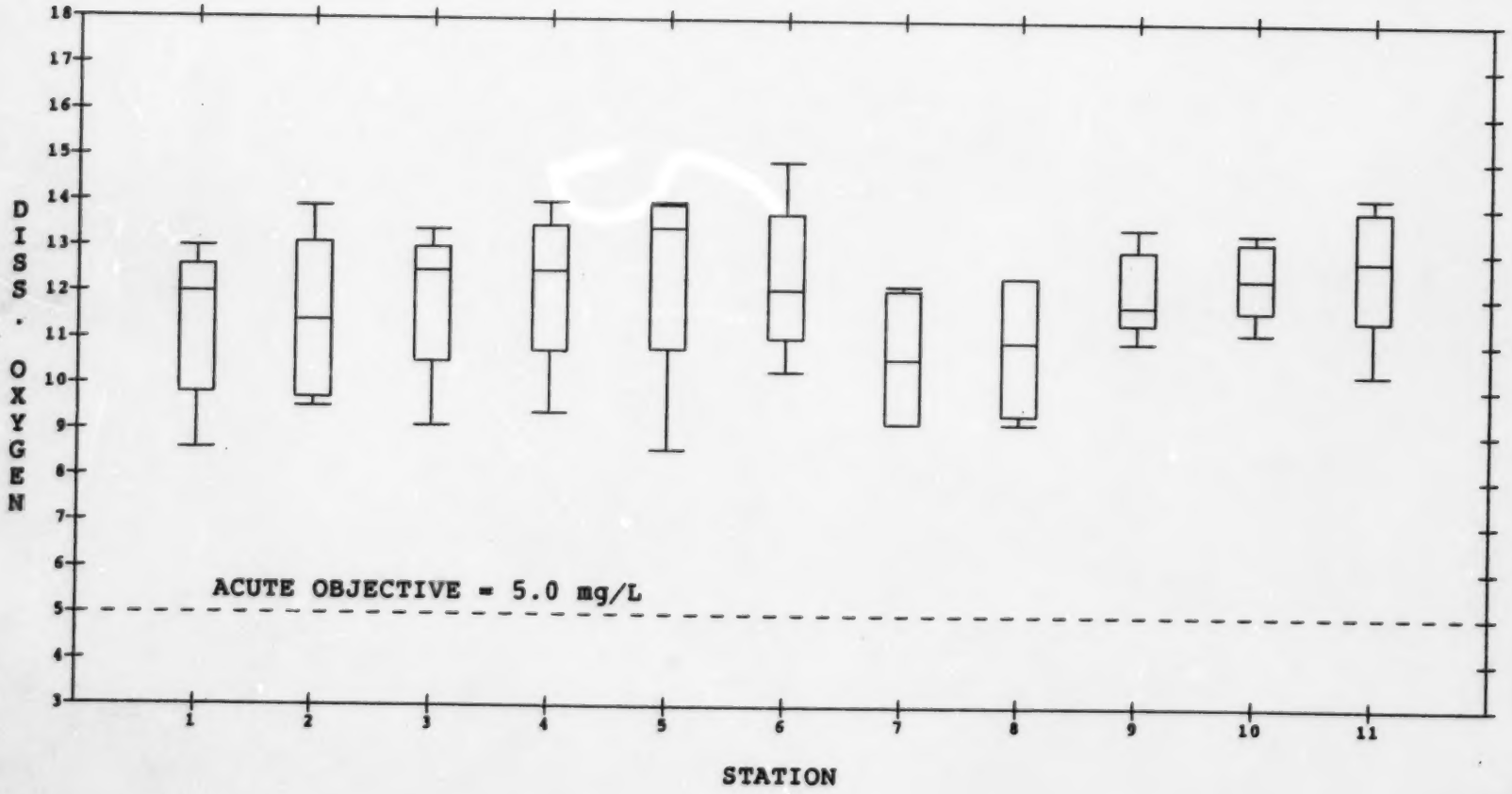


FIGURE 5
DISSOLVED OXYGEN (% SATURATION) AT ELEVEN
STATIONS IN THE INTERNATIONAL SAINT JOHN RIVER
BASIN - 1988

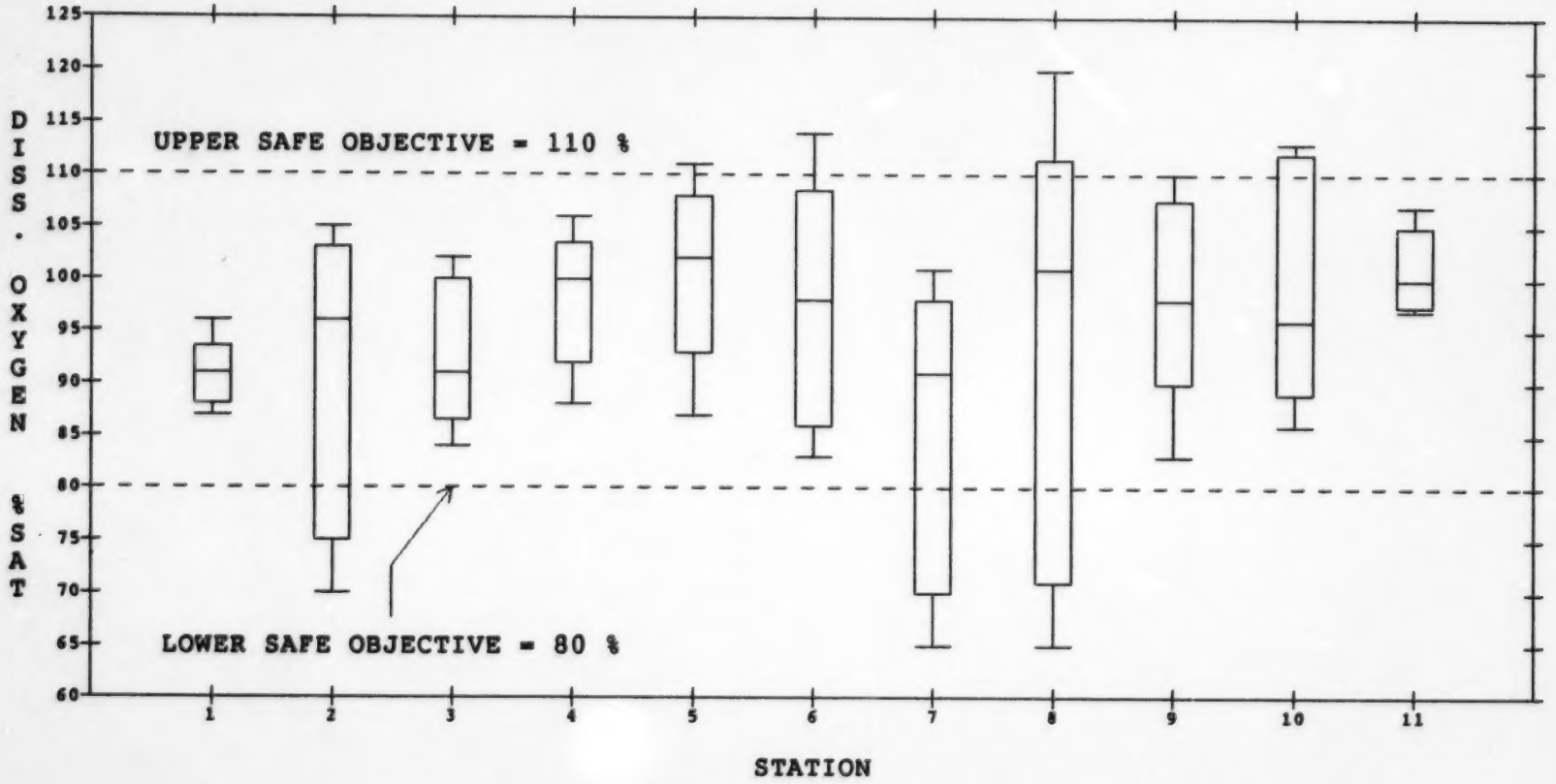


FIGURE 6
LABORATORY pH (pH UNITS) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988

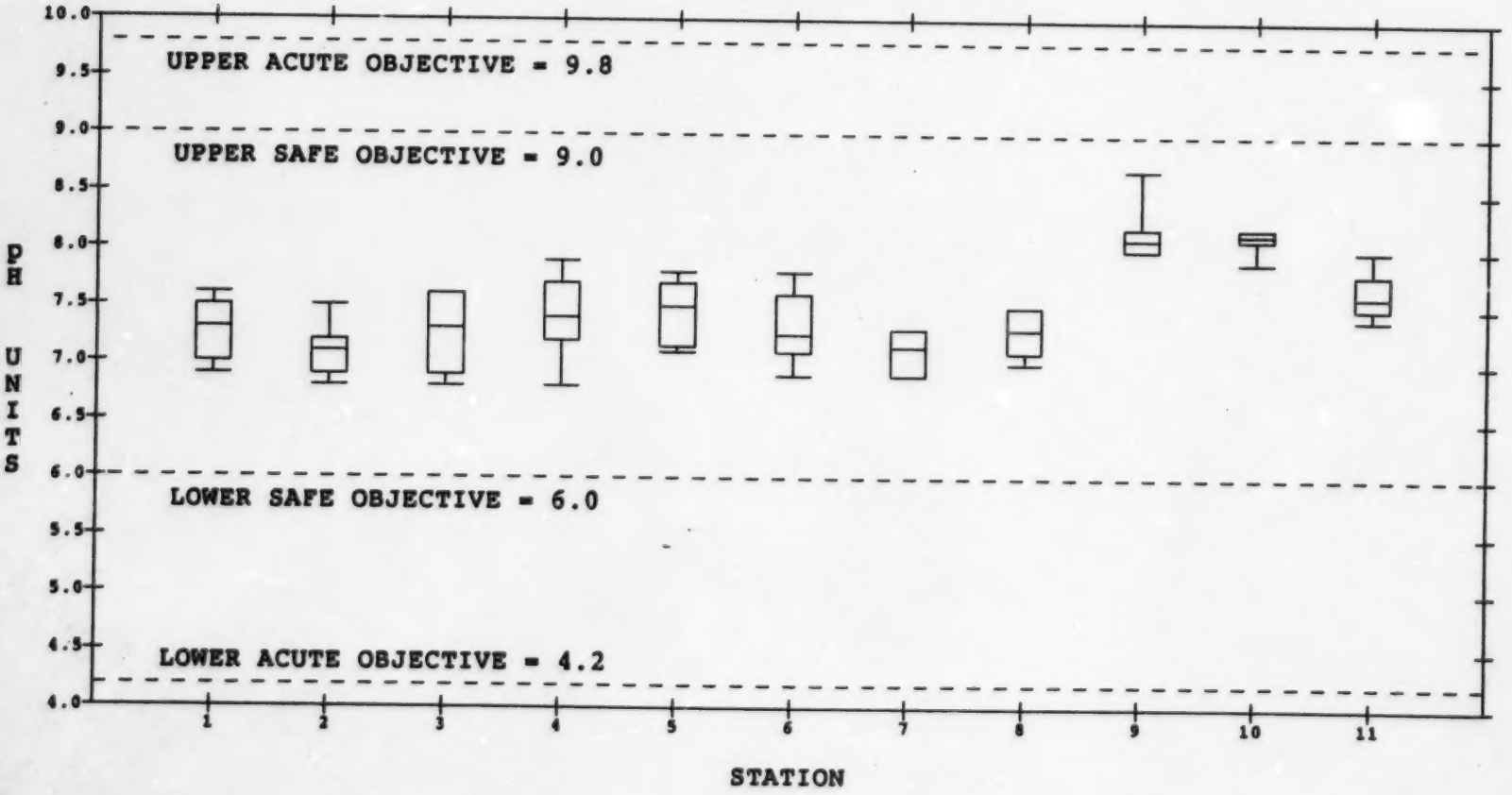


FIGURE 7
FIELD pH (pH UNITS) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988

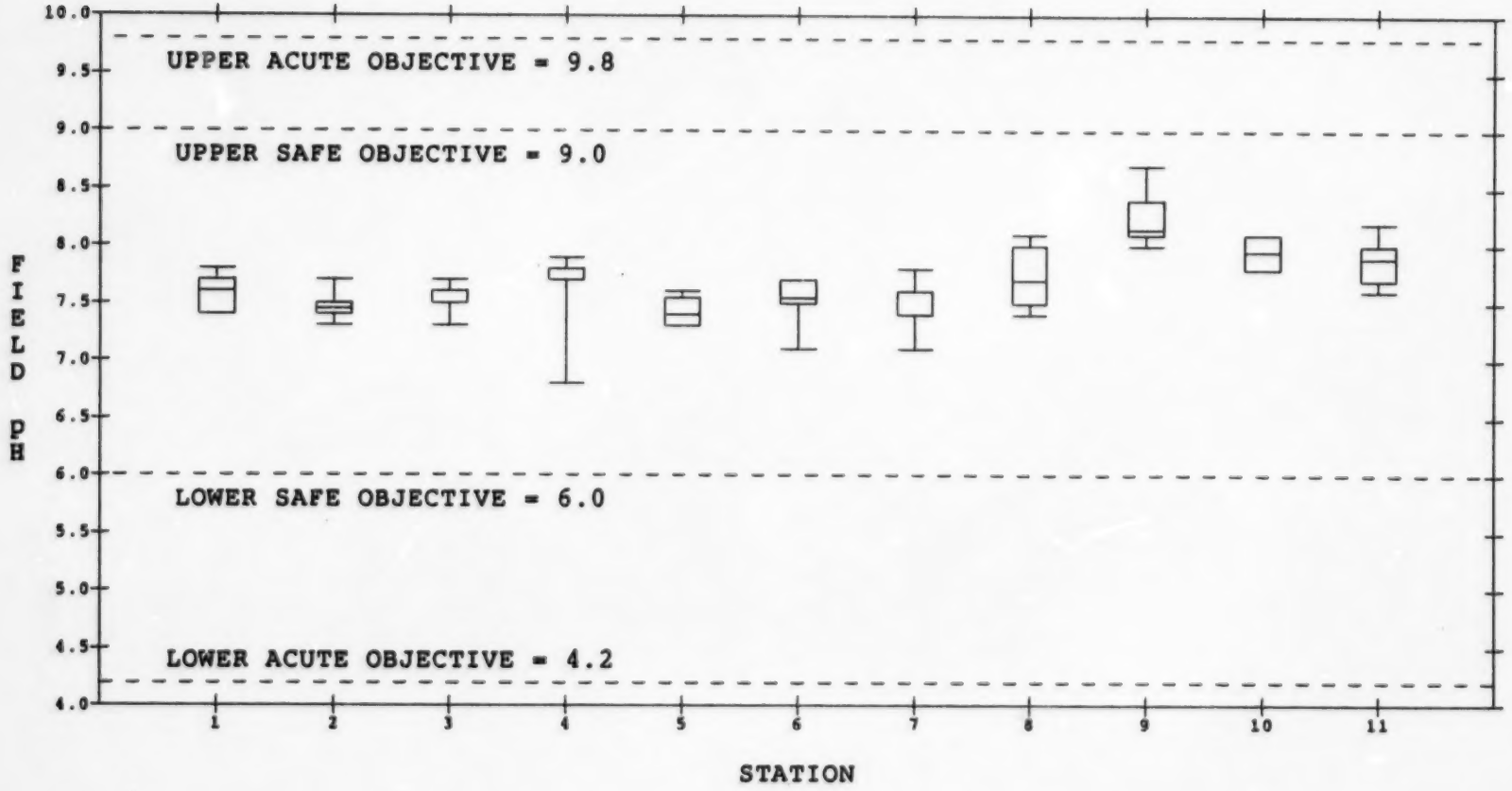
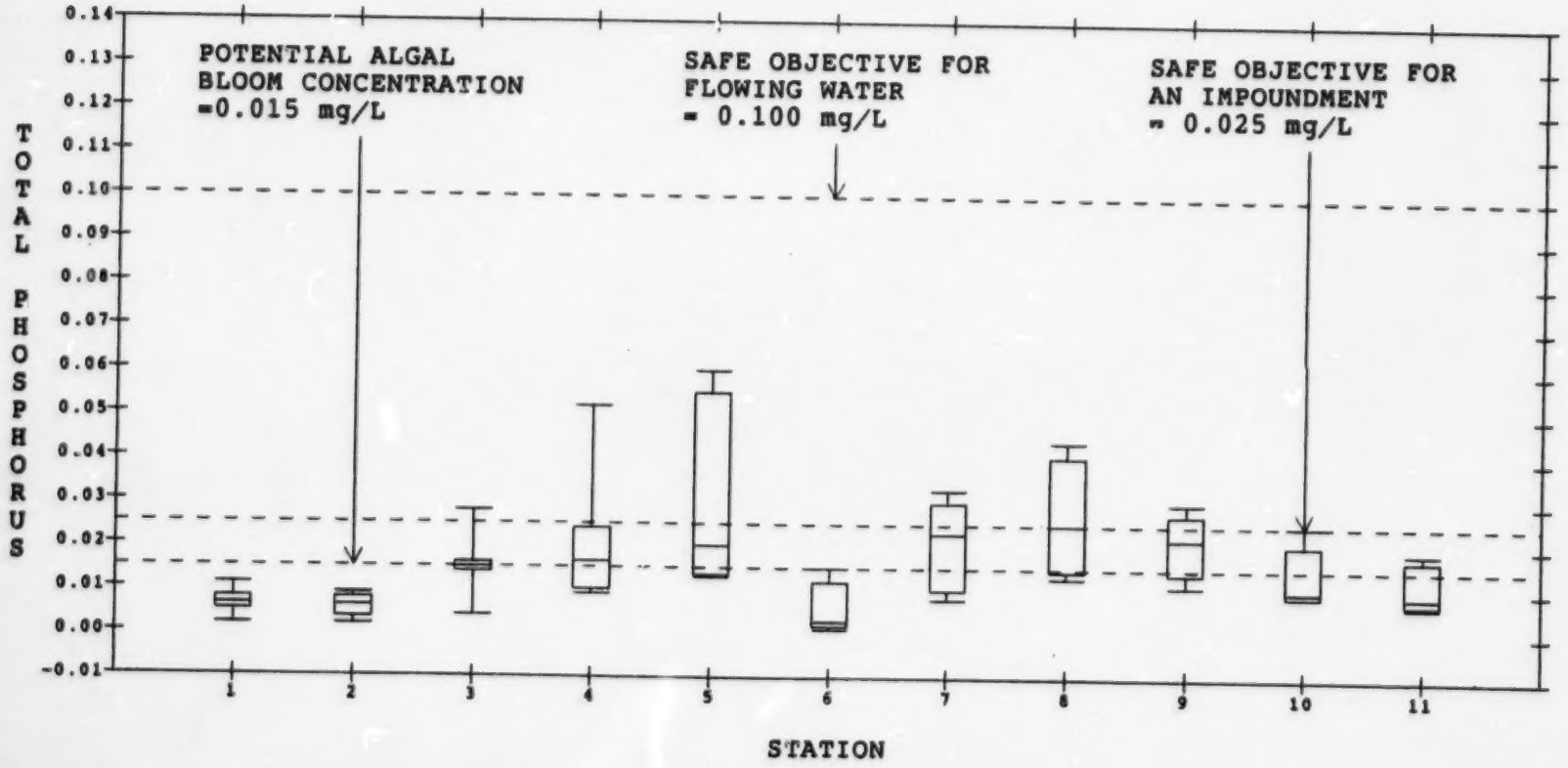
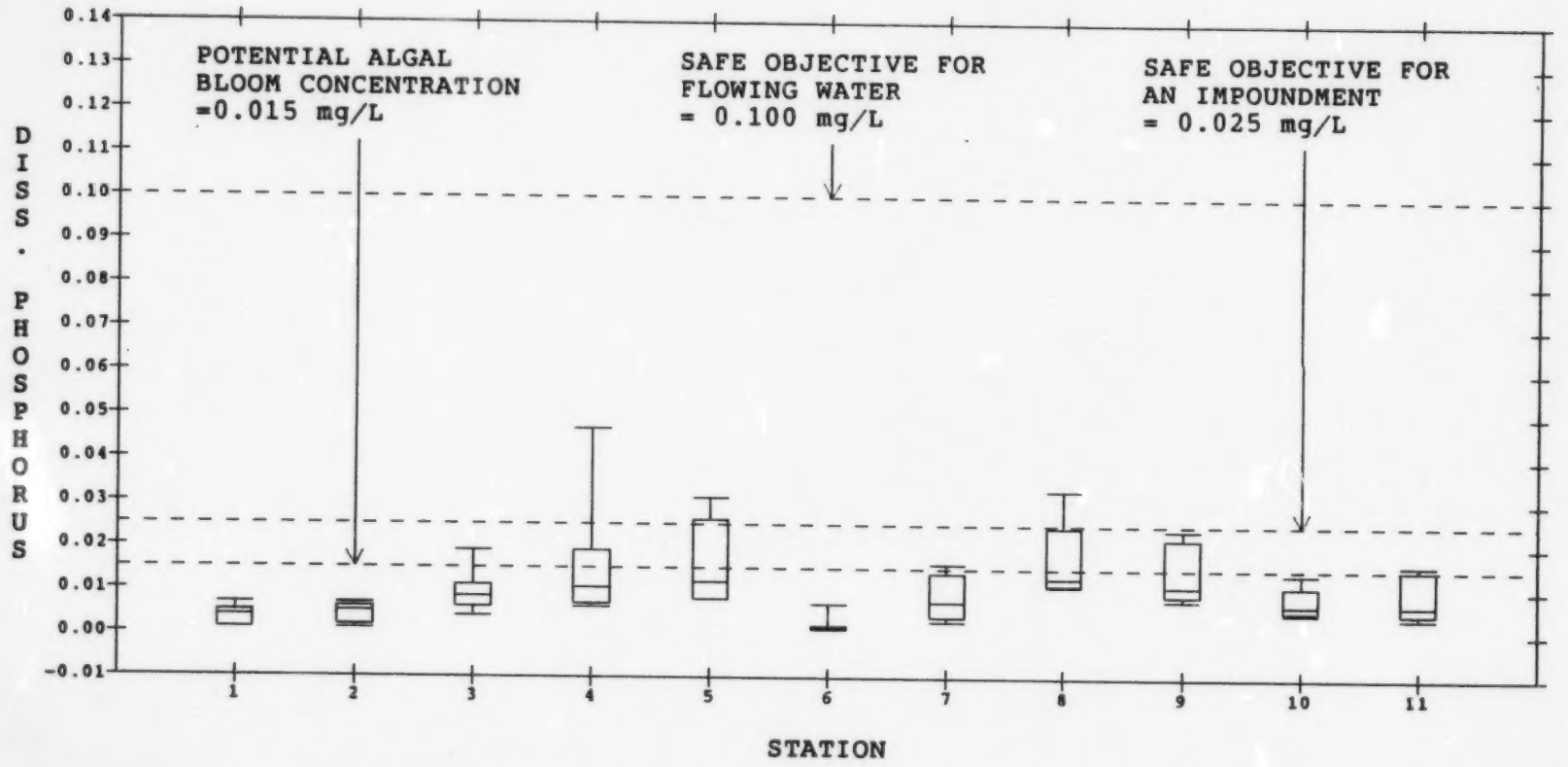


FIGURE 8
TOTAL PHOSPHORUS (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



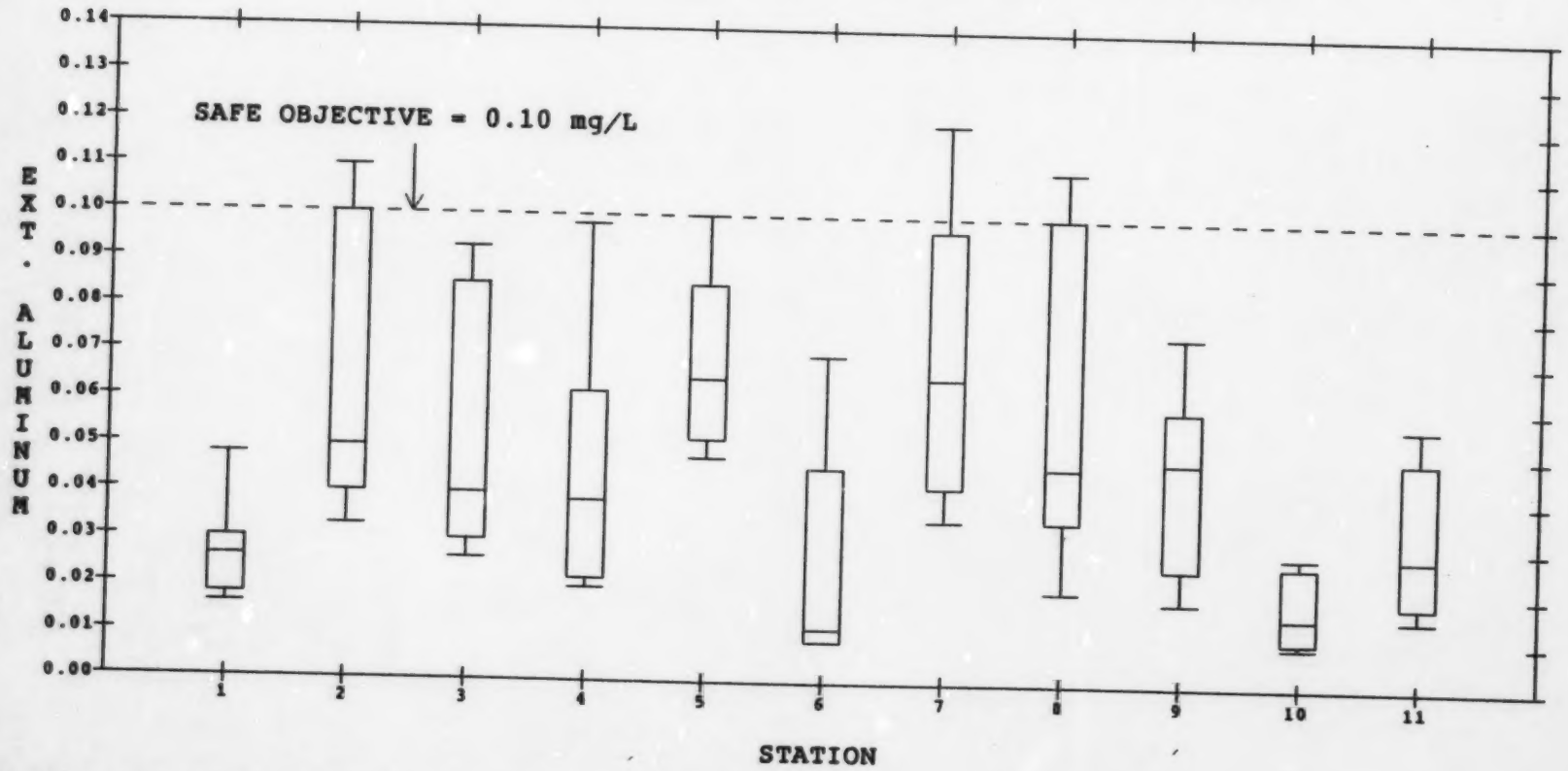
Detection Limit for Total Phosphorus = 0.001 mg/L

FIGURE 9
DISSOLVED PHOSPHORUS (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



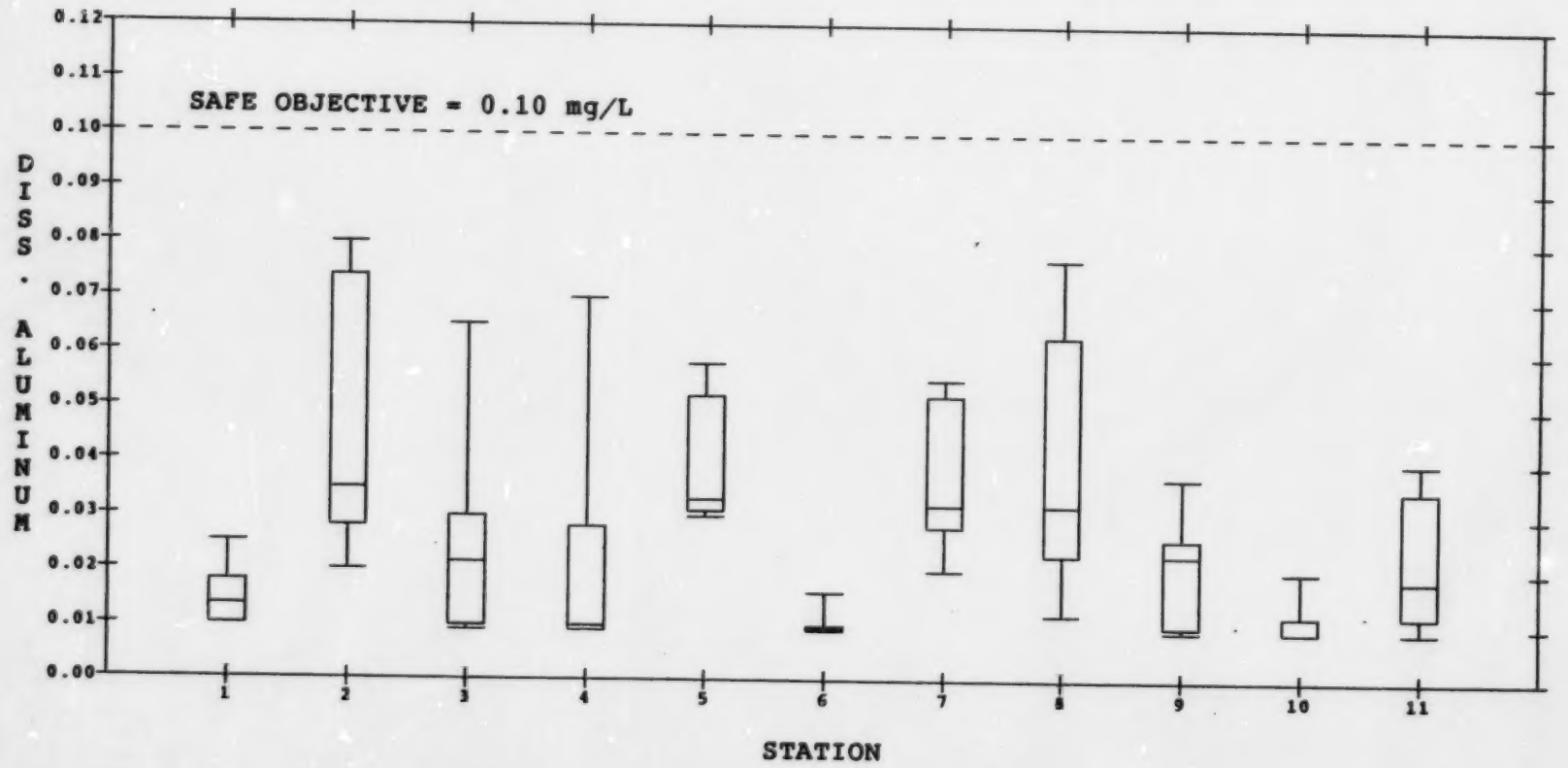
Detection Limit for Diss. Phosphorus = 0.001 mg/L

FIGURE 10
EXTRACTABLE ALUMINUM (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



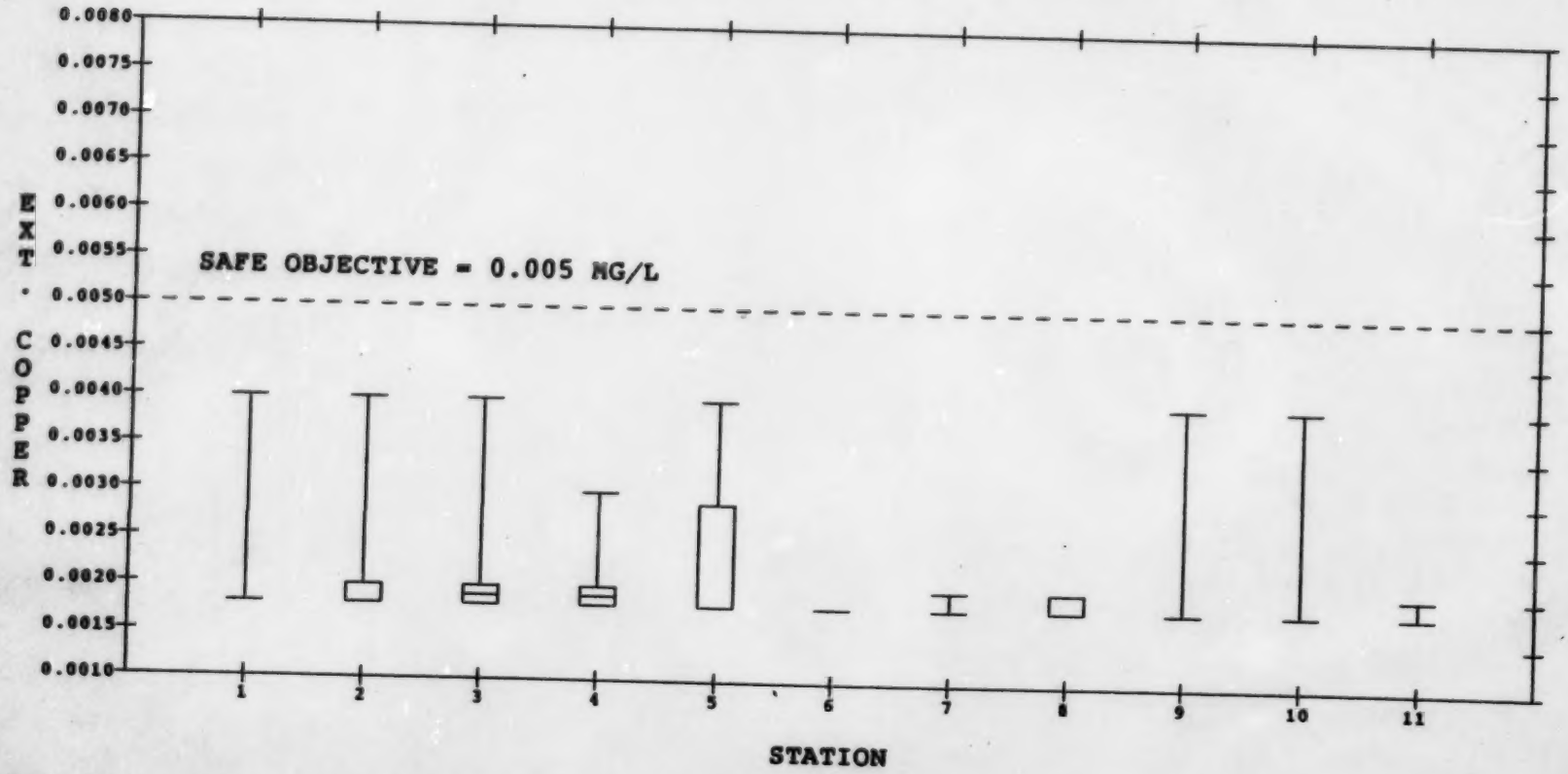
Detection Limit for Ext. Aluminum = 0.01 mg/L

FIGURE 11
DISSOLVED ALUMINUM (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



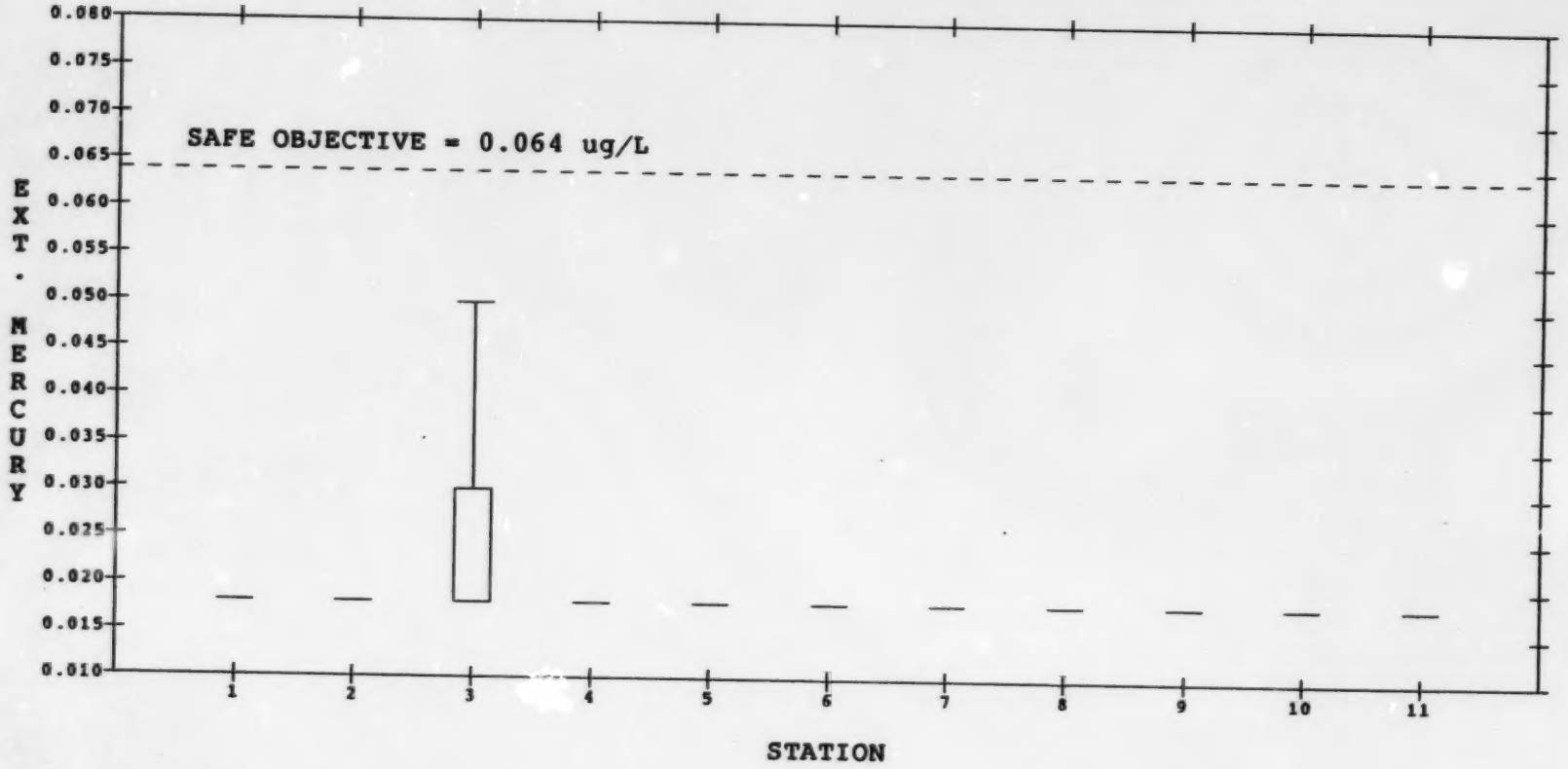
Detection Limit for Diss. Aluminum = 0.01 mg/L

FIGURE 12
EXTRACTABLE COPPER (MG/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



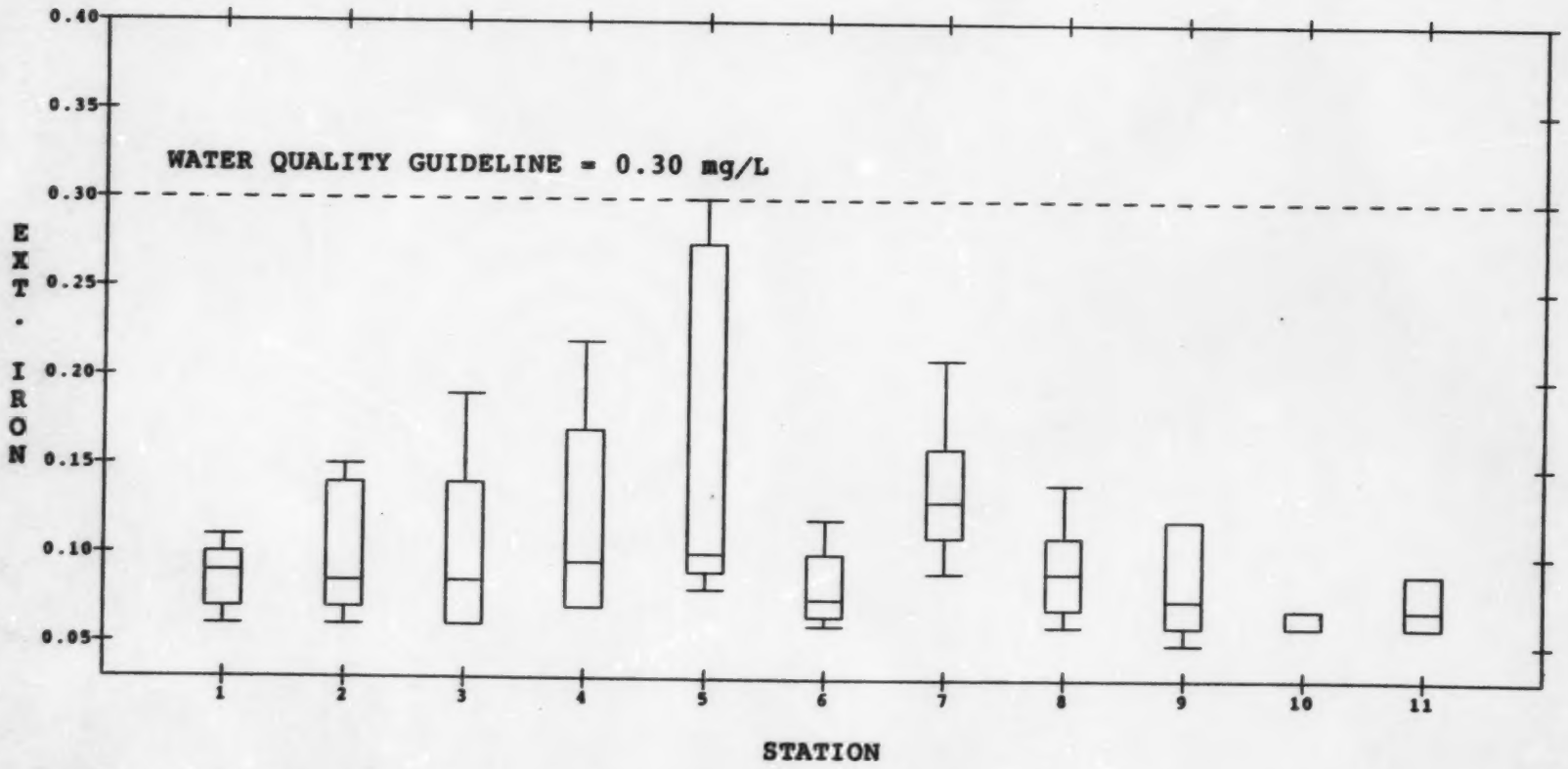
Detection limit for Copper = 0.002 mg/L

FIGURE 13
EXTRACTABLE MERCURY (ug/L) AT ELEVEN STATIONS IN THE
INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



Detection Limit for Mercury = 0.02 ug/L

FIGURE 14
EXTRACTABLE IRON (mg/L) AT ELEVEN STATIONS
IN THE INTERNATIONAL SAINT JOHN RIVER BASIN - 1988



Detection Limit for Ext. Iron = 0.01 mg/L

FIGURE 15
DAILY TOTAL PHOSPHORUS (mg/L) AND DISCHARGE (M**3/S)
AT THE AROOSTOOK RIVER AT TINKER FROM
JUN 28 TO SEP 8,1988

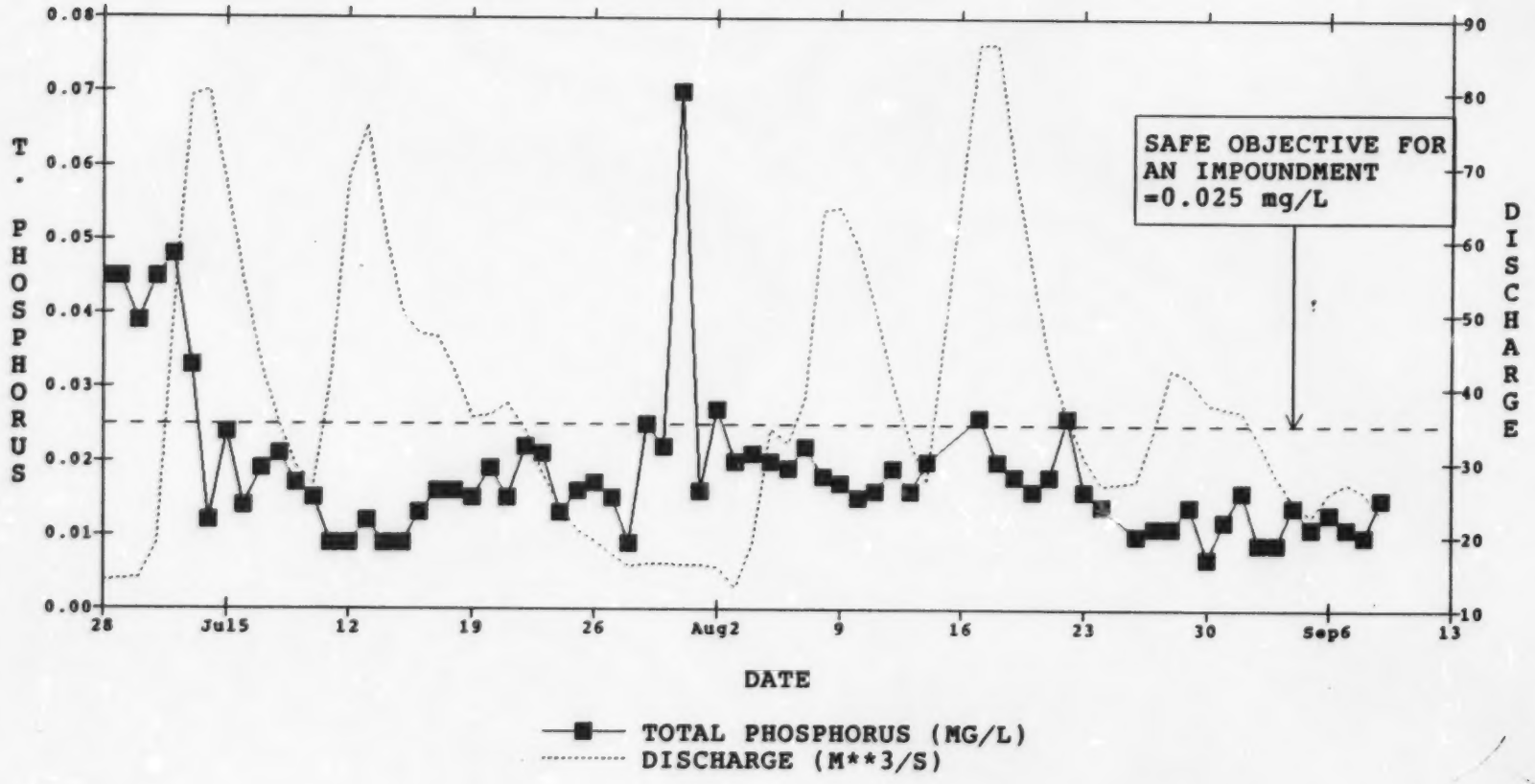


FIGURE 16
DAILY TOTAL NITROGEN (mg/L) AND DISCHARGE (M**3/S)
AT THE AROOSTOOK RIVER AT TINKER
FROM JUN 28 TO SEP 8/1988

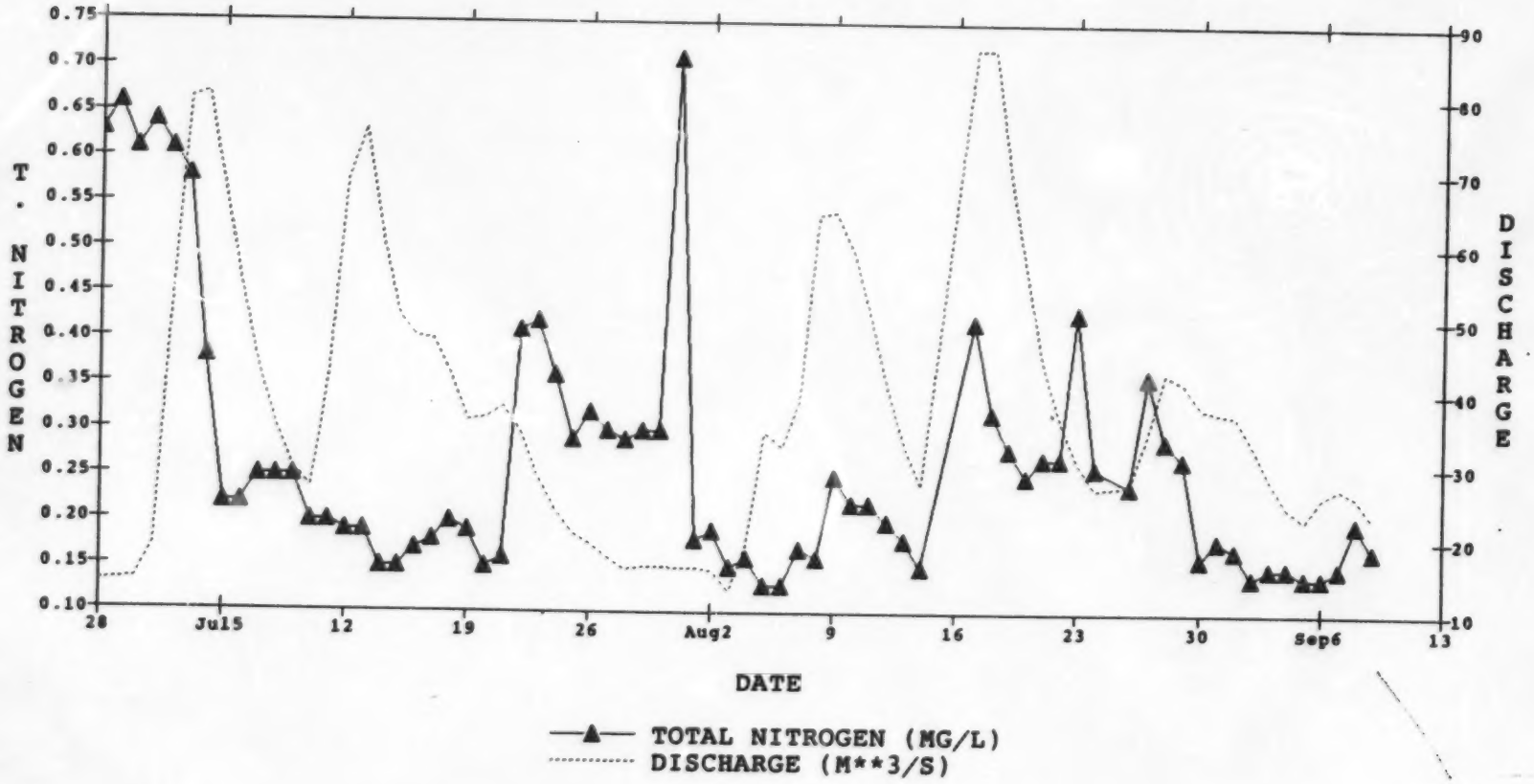


FIGURE 17
PHOSPHORUS LOADING (KG/DAY) AND DISCHARGE (M**3/S)
FOR DAILY SAMPLES AT THE AROOSTOOK RIVER
AT TINKER - JUN 28 TO SEP 9/88

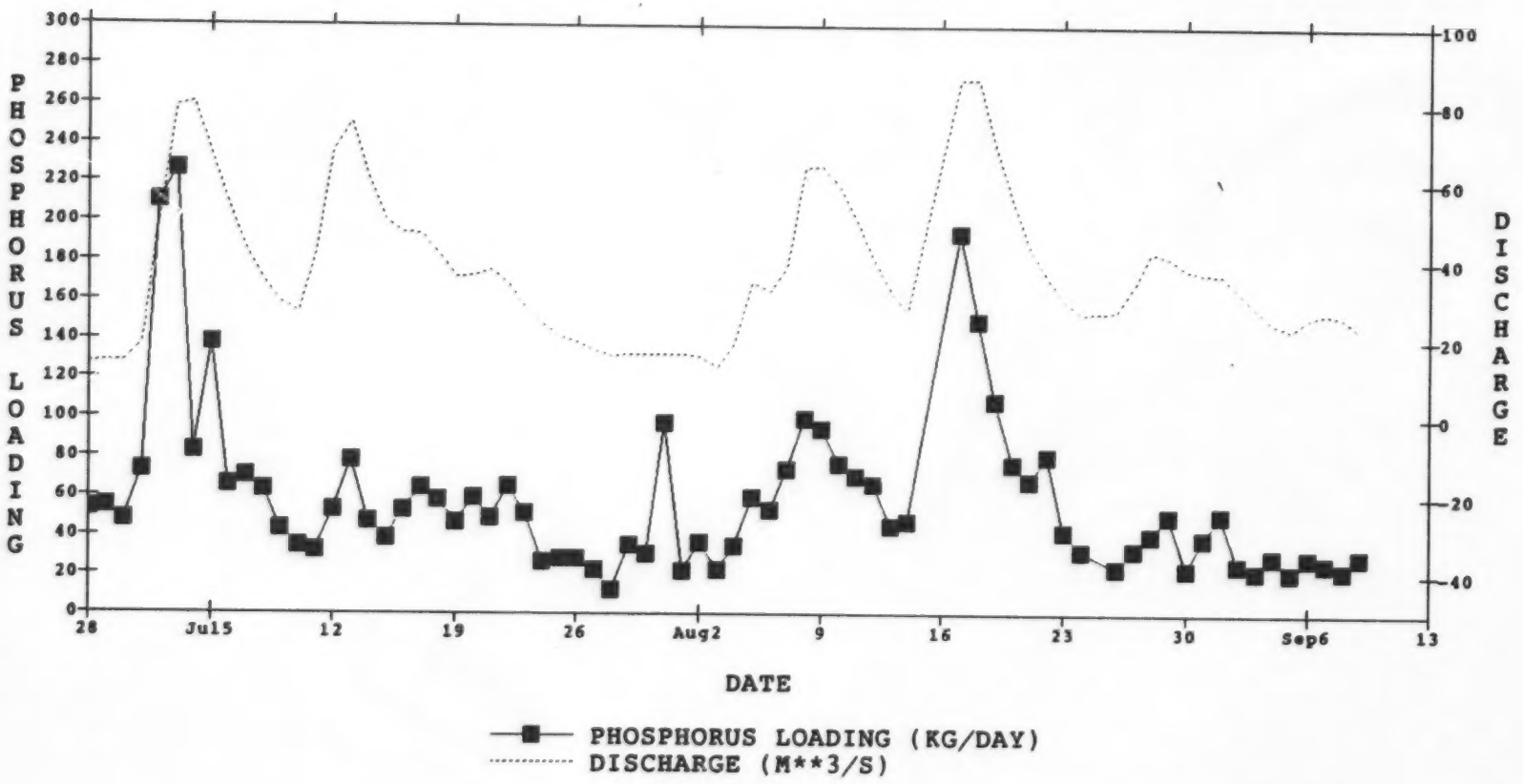


FIGURE 18
TOTAL NITROGEN LOADING (KG/DAY) AND DISCHARGE (M**3/S)
FOR DAILY SAMPLES AT THE AROOSTOOK RIVER
AT TINKER FROM JUN 28 TO SEP 9/1988